July 1961

Agriculture

Volume 68 Number 4

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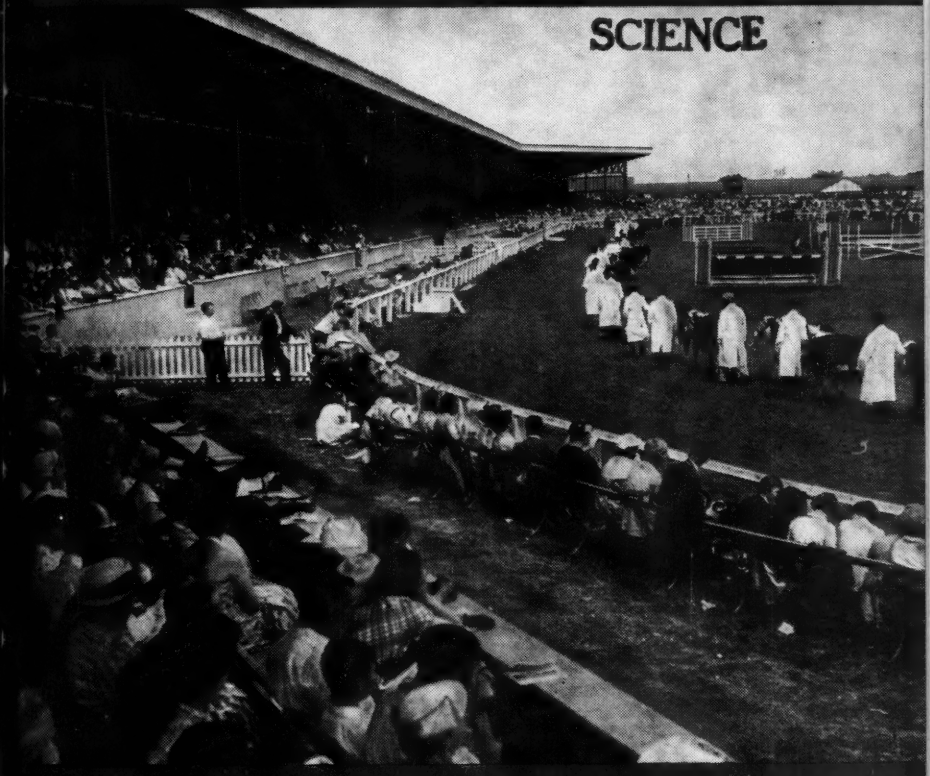

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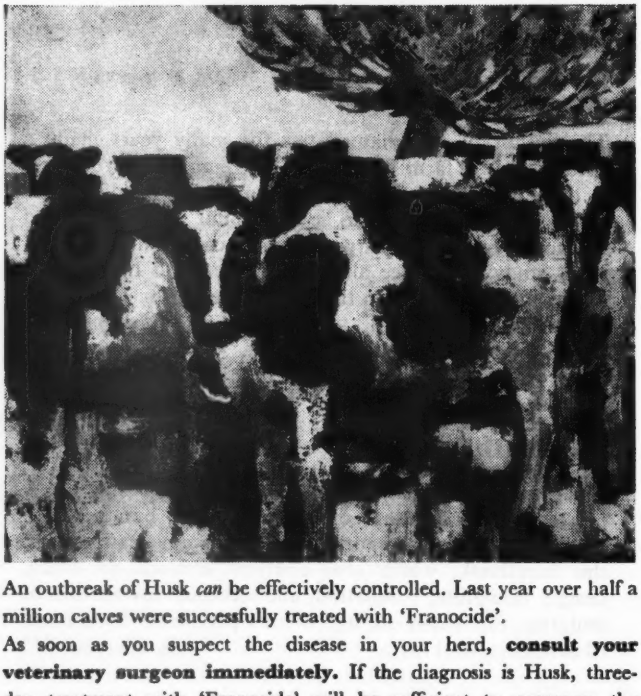

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Cover Photograph: Main Ring and Grand-stand at Harrogate

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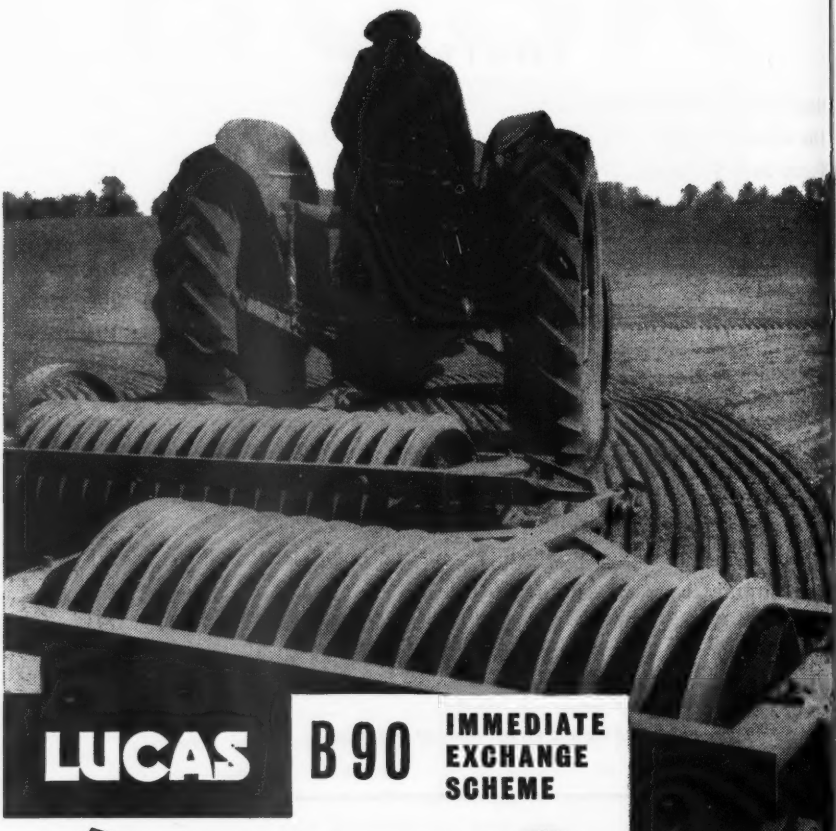

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Horticultural Marketing Council

E. H. GARDENER

National Farmers' Union

An account of how the Horticultural Marketing Council was set up, and how in the words of its Chairman it aims to show that when an industry works as a single unit, it can give the consumer better value for money and eventually bring credit and prosperity to itself.

THE Horticultural Marketing Council came into being as a result of a recommendation by the Runciman Committee on the Marketing of Horticultural Produce. For a number of years the respective organizations of the three sections of the industry—that is, the growers, wholesalers and retailers—often met to discuss common problems and, in fact, for some years a joint committee, formed by the National Farmers' Union, the Wholesale Fruit and Potato Trades Federation and the Retail Federation had regular meetings. It has been apparent for many years that the marketing and selling of fruits and vegetables created problems all through the chain of distribution which could only be satisfactorily settled by mutual discussion of those problems, discussion which could only be really fruitful if it took place on a basis of mutual trust.

The Horticultural Marketing Council consists of 28 members: 7 from each section of the industry, 4 independent members and 3 trade union members. It sits under the chairmanship of Mr. David Bowerman, a man of considerable farming and wholesaling experience, under whose wise guidance it has indeed got off to a good start. The right basis has been created for tackling difficult problems, which unless carefully handled could cause marked contention between the various sections. On the staff side an old friend of the industry, Mr. P. J. Moss, who was in charge of the Horticultural Division at the Ministry of Agriculture, is the Chief Officer, and under him an efficient and enthusiastic staff has been built up.

The Runciman Committee recommended that the industry should pay for the Council if equitable means could be found of doing so, and if the Council proved itself to the industry to be a worthwhile body. The Government took the view that the industry should pay for the Council from the word go, and that unless it was prepared to do so, they would not be prepared to set it up. Ultimately a compromise was reached and the Government has agreed to finance the Council for the first three years. After that, if the Council is to continue the industry must pay for it.

The first three years

Three years is a very short time for an organization to prove itself to the industry and to do such work that will make the industry support it in the future. Not only has it got to do the work, but it has to explain to the industry what it is doing—by no means an easy task. The very fact that the Government is financing it initially precludes it from undertaking certain work such as publicity, except in a limited form, which I believe it will ultimately do

when the industry as a whole finances it, but considerable progress has been made with what one might term the "bread and butter" work.

Problems of transport and grading immediately spring to mind as the sort of work which can effectively be carried out by the joint efforts of all three sections of the industry working under one body, and as one would expect, committees have been set up to deal with these matters. An energetic campaign to improve the handling of horticultural goods in transit has been carried out with the active help of Trade Union members of the Council. This will be repeated in the various sections of the industry, and in the transport concerns. Particular problems associated with the handling of certain horticultural products, such as soft fruit, have again been the subject of detailed attention. While it is quite true that individual organizations—my own Union particularly—have done a great deal of work on various aspects of transport and will, of course, continue to do so, there is no doubt that where the problem is a common one it can be handled more effectively by the Council.

Grading again is a problem which affects all sections of the industry. The council has no power to impose statutory grades, but it can introduce recommended ones and, in my view, these will come to play a very great part in the general betterment of horticultural produce in the shops.

Looking at markets

Practically no basic research has ever been done into markets as such. Their development has been completely haphazard, and conditions in them can be described as chaotic. Moreover, one city tends to know very little about market developments in others. To assist in overcoming these shortcomings, the Council has appointed a statutory Markets Committee. This consists both of members of the Council and certain members who have particular knowledge of the problems of markets. What the Council is trying to do through its Markets Committee is to create an authoritative body with a vast experience of markets so that cities and towns can obtain all the information they require when faced with the problem of rebuilding their markets.

The Council and its staff have shown particular initiative in undertaking a series of lectures in Birmingham Market which might come under the heading "The Technology of Marketing". Similar lectures will be given in other markets. Knowledge about marketing, as far as the wholesaler is concerned, is something that is acquired by experience. There are no books of reference about it, and no one who aspires to enter the wholesale trade really knows to whom he may turn, outside the firm for whom he may work, for advice and guidance on his job. The Council hopes to remedy this, and hopes to be the body which can create for the wholesalers some form of advisory service which will help wholesalers just as the N.A.A.S. helps the grower. Without any question, too, we shall hope to see an advisory service for retailers. Again, the retail trade has no books of reference about the handling and presentation of fruit and vegetables, and if the Council offer them a similar service, it will indeed be doing a valuable job for the improvement of the industry as a whole and for the benefit of the housewife.

In this article, quite obviously I cannot touch on a number of the Horticultural Marketing Council's activities. They have been concerned, for example, with the problems of consumer research, with containers and

processing fruits. What I think is really important is its future, and I want to make it quite clear first of all that whatever work the Council does, it can never take the place of the organizations which are its main constituents. The functions of the National Farmers' Union, the Wholesale Fruit and Potato Trades Federation and the Retail Federation are quite different. They are bodies brought into being on a democratic basis, depending for their strength on that basis, whose duty it is to look after the particular problems of the various sections they represent. In this respect the Horticultural Marketing Council is like a marketing board. Its job is to improve marketing. It can have no political voice basically because it is a statutory body, and has not been set up to do the work which is done by the organizations I have mentioned. In fact, like a marketing board, it has no future whatsoever unless it can make a contribution to marketing; and I most definitely believe that it can. It has already shown great promise of so doing, but it would be idle to pretend that there are not going to be difficulties ahead.

Bold approach to future problems essential

If it is to be effective in the realm of marketing, it must show boldness and courage in facing basic problems. I would like to illustrate this by commenting on developments in horticultural marketing on the Continent. For many years the Dutch have used a clock auction system, and they think it has proved most effective. For a variety of reasons, what was applicable to them did not seem applicable to us. That situation appears to have altered. The clock auction system has spread to Belgium, where conditions are rather similar to ours. It has now spread to Germany, where conditions are very like ours, and it is being developed in France. It seems to be the accepted form of marketing within the Common Market. I was pleasantly surprised to find when I was in Germany recently that the wholesalers themselves value this system. It does not, of course, make any difference to the need for wholesale markets: these still exist, as in this country, and retailers go and buy in them. The difference is that the wholesalers buy what they want in the auction markets. I greatly welcome, therefore, the H.M.C's decision to investigate what is happening on the Continent. We can learn from others in most spheres of life and we certainly can in the realm of horticultural marketing. If the Council is to be of real service to the industry, it must show itself progressive enough to examine in detail methods which may involve change and may, therefore, come up against that inertia in some places which so often shows itself when change is involved.

More and better publicity

All sections of the Council are agreed that more publicity work should be undertaken. So far, of course, with limited Government finance, any publicity that has been undertaken could only be of an educational nature and, in fact, even in the future it is difficult to envisage the Horticultural Marketing Council carrying out a compaign of the kind which the manufacturers of, say, detergents undertake. It probably is not necessary for horticultural produce anyway. When the industry pays for the Council, however, we shall, I think, see a considerable expansion of this work, even if money continues to be limited. Public relations publicity can be of great benefit to the industry,

and information about supplies on the market at particular times can obviously help both the industry and the housewife. Under Clause 15 of the Act, of course, there is a power for the growers to set up an organization allied to the Council which can undertake publicity for home-grown produce. I believe that this will come about, and that ultimately we shall see finances passed on perhaps to some of those bodies which are already in being; and we shall see some amalgamation of other bodies. What is quite certain is that publicity for horticulture must go on, and the machinery will be available for the collection of funds for that purpose.

Finally the Council has one very serious and difficult problem to overcome —how can the industry pay for it equitably. How to collect money fairly from growers of varying sizes and from a vast multiplicity of retailers, who vary from the little village shop selling one basket of tomatoes a week, to the chain store, is difficult in the extreme. For my part, I think we shall find a solution to this either by means of what one might term the levy system or the licence system. But let there be no mistake about it, the finding of the answer is not going to be easy. It is going to need good will and understanding on all sides of the industry, and also on the part of the Government, who, having presented the industry with this problem, the difficulties of which the Runciman Committee recognized, has also the responsibility to Parliament to see that its solution is equitable. Of one thing I am sure: the problem is well worth solving.

The Great Yorkshire Show

LT.-COL. SIR JOHN DUNNINGTON-JEFFERSON, BT., D.S.O., LL.D.
Honorary Show Director

The acquisition and vigorous development of a permanent show site is proving a financial success, so much so that by 1970 the Yorkshire Agricultural Society hopes to be able to plough money back into agricultural education and research.

THE Yorkshire Agricultural Society is by no means the oldest of the major show societies, although it is of quite respectable antiquity, having been founded in 1837. The declared objects of the Society were, I imagine, very much the same as those of other similar organizations; namely, to hold an annual "exhibition" of agricultural livestock and implements, and to do quite a number of other things for the betterment of agriculture which few, if any, of the show societies can do today, simply because they are so busy trying to keep their annual show "out of the red" that they have little or no money to spare for anything else.

The first Great Yorkshire Show was a one-day affair which was held in 1838 on the barrack square in York, an area of about five acres. The total gate receipts were £231 7*s.* 6*d.* From then onwards the show was held in a different centre each year, except during the wars, when no shows were held, and when the Royal Show visited Yorkshire. Between 1838 and 1950, ninety-three shows were held on temporary sites.

Decision to buy a permanent site

After the second world war the Society decided to buy a permanent site. The two principal reasons for this decision were, first, that good sites were becoming increasingly difficult to find and, second, that the facilities provided by temporary buildings on a temporary site were quite inadequate for members, exhibitors, stockmen and livestock. A third and subsidiary reason, though less apparent then than it became later, was the increasing cost of transport and show erection.

When the idea of a permanent site was first mooted, strong opposition was expected from some of the Society's members. However, when the time came to lay the proposal before a Special General Meeting, the opposition faded away and, if I remember rightly, only one member voted against it. It was envisaged at the time that the show might occasionally break away from its permanent site and pay a visit to some distant part of the county, but it can safely be said that this will never happen.

And so, in 1950, an estate of 250 acres on the outskirts of Harrogate was purchased. Harrogate was chosen because it is almost the exact centre of Yorkshire, with excellent road and rail communications, a plentiful supply of hotels, and last but by no means least a very friendly and co-operative Corporation.

Financial benefits

Briefly stated, the economic objective of the permanent site system is to reduce the annual cost of staging the show to such a level as to ensure a surplus irrespective of bad weather or other unfavourable conditions. With this end in view it was realized at the outset that the full benefits of the system could not be obtained unless development was started immediately and pressed forward as rapidly as finance would permit. That policy has been vindicated over and over again, and within ten years more than £500,000 has been spent on buildings and services. Even now the showyard is by no means complete, and plans have been made which will bring the total cost up to about £700,000 during the next two or three years.

In the early days at Harrogate the emphasis was laid upon replacing those temporary buildings which cost the most to build or hire. Thus, a good and quick return was obtained on the capital outlay. Gradually the priorities were changed to replacing certain buildings with new ones that would make showing and attending more attractive and less tiring. Today the policy is still towards early completion, and it is hoped that by 1964 or 1965 development will substantially be finished, though of course there will always be something to do each year by way of extension and improvement.

Developing the site

Development of the site presented a very complicated problem, emphasizing the need for a pilot show before final plans were made. In fact, the first layout (1951) was found to be quite unsuitable, and a completely new plan was adopted for 1952. This plan was accepted for full development and was based on a centrally situated Main Ring, oval in shape, with the remainder of the ground divided into sectors by avenues radiating from the Main Ring

to the various public entrances, of which there are five. Such a layout greatly simplifies the problem of finding one's way about. It also permits extensions to be made, within limits, without disturbing the general plan. The showground is almost entirely surrounded by car parks.

Within the framework of the layout plan, provision was made for certain educational exhibits of a permanent nature. For example, the National Agricultural Advisory Service has the use of some five acres for its annual exhibit and for permanent demonstration plots. The Forestry Commission has a further five acres, most of which is permanent woodland. The Milk Marketing Board, the Young Farmers, the Rural Community Council, the Women's Institute, the County Farm Institutes and an increasing number of trade exhibitors have permanent buildings or sites.

The showground itself is on a slight slope with a south-east aspect. At first thought to be a disadvantage this slope has proved to be a great help, and the view of the surrounding countryside is most attractive. By cutting out the Main Ring and most of the judging rings, it has been possible to provide natural banks for spectators. Round the Main Ring alone some 14,000 people can stand on the banks, apart from 6,000 seated in the grand-stand. The levelling of the Main Ring was a major operation involving the removal of 100,000 tons of soil. The slope of the ground has also been a help in the laying of drains and sewers.

Developing the show

The Society is now in a much improved position for developing the show as opposed to the showground, and the most interesting part of the Society's development is thus only beginning. The show has, of course, much increased in size since 1951, and buildings put up as recently as six years ago are beginning to be slightly cramped. For example, in 1955 the largest cattle shed in Europe was built to accommodate 486 animals, and another one for 200 animals was put up at the same time. With plenty of room for expansion it is now obvious that extensions must be made, as cattle entries have increased by twenty-five per cent.

Thus the Great Yorkshire Show has developed along a line of its own and, whatever may be its merits as a show, at any rate it has proved to be a financial success, as the average surplus during the last five years has been £45,000, with an average attendance during the same period of 102,560.

There can be no doubt that the increased use of motor transport, both private and public, has contributed very substantially to show attendance within recent years. Average attendances at the Great Yorkshire Show indicate this all too clearly. During the nineteeth century the average attendance was 32,308. In the first half of the twentieth century it rose to 53,209. In the last ten years at Harrogate the average rose to 86,564—a figure which is higher than the pre-permanent record. This factor may give rise to a very serious problem on a permanent site. Our experience at Harrogate has been that, with an attendance of 100,000, an additional five acres of car parks are required each year to keep pace with the increasing number of cars used by visitors. On this basis, it seems that any show society contemplating the establishment of a permanent site would be wise to allocate for car parking an area at least double that of the showground itself, and preferably three times as large.

Education and research

What of the future? If nothing unforeseen happens, and if the show continues to receive the same measure of support as in recent years, then the future is assured. The Great Yorkshire Show is regarded as a means to an end and not as an end in itself. Our objective is to reach a position in which we shall be able to "pay a dividend". By this I mean repaying to the agricultural community in Yorkshire some part of what that community has contributed towards the success of the show through their loyalty and support. This can be done in several ways, with the emphasis on education and research. Before 1970 we shall be clear of debt. The total cost of development, amounting to about £700,000, will have been written off in our balance sheet, and we shall find ourselves with an overall annual surplus of at least £50,000. By that time we shall have begun to restore our reserve fund at the rate of say £20,000 a year. Reserving say £10,000 a year for further development, this will leave us with a residual surplus of £20,000 a year with which to pay the "dividend". By 1980 we should be able to increase the dividend to £30,000 a year. If this forecast materializes, and if its surplus funds are disposed of wisely and effectively for the benefit of the farming industry, the Yorkshire Agricultural Society will at least have the satisfaction of having achieved the full purpose of its foundation.

Sheep as a Sideline

FRED BATES

Denby Dale, Huddersfield

Sheep are something of a relaxation for the overworked dairy farmer, says Mr. Fred Bates, who farms 380 acres in the West Riding. But more than that—they are *profitable*.

A DAIRY herd of about 100 Ayrshires producing milk for farm bottling is my main concern. But I have found a subsidiary interest in sheep to be a profitable sideline. There are a number of reasons why I keep sheep. One is that I like their company, another is that under good management and with average luck, the return on capital, and per acre, can often equal that of cereal cash crops. They also ensure that fences are kept in first-class condition, and they are a great help in grassland management. We often get a surplus of grass in the autumn, which I prefer to eat off with sheep rather than with cows. Above all, they are profitable without demanding the meticulous attention which dairy cows call for. In short, they are something of a relaxation for the overworked dairy farmer.

I have kept sheep in this way for the past thirty-two years, and during that time my farm has seen many changes in sheep breeds and their management. I began with Kerry Hills, changed to Cluns, then to Greyface, and now most of the present flock are Mashams. All these breeds and crosses are suitable

for fat lamb production from grass, but some are more suitable than others under our conditions. By the way, Suffolk tups have always been used and always will be.

Let us start with what I would describe as the shepherd's year. The system set out below has been used for nine years without change, except for the breed of sheep.

Shepherd's year

In August we wean any lambs that have not got away fat, remembering always to take ewes away from lambs, and not the other way round. The ewes are put on poor pasture at the rate of 20-25 per acre, taking care that they have access to clean water. They are dosed with reliable worm drench and then left on bare pasture for 14 days. Also, during August we shut up 10-15 acres per 100 ewes of good grassland and apply 3-4 cwt nitrogen. These are kept closed until sometime in December, by which time there is enough foggage to keep them going during the most difficult part of winter.

During September the ewes are run on to rather better pasture, injected with pulpy kidney vaccine, all feet are trimmed and we try to be quite sure that all ewes which are to be put to tup are in good, hard condition. This flushing business is not as simple as some people would have us believe; personally I would rather have ewes a shade too fat than too thin at this time of year.

On 1st October we turn out the tups, one tup to about 40 ewes. During this time the sheep must be kept on really good grass for about a month. After the cows have been taken off in November, the sheep run over cow pastures, and stubbles, clearing any top grass which the cows have left. This helps to keep a good balance between grass and clover.

Sometime during December, depending on the weather, the ewes are brought on to the foggage. To make the best use of this it should be netted, but it is not absolutely essential. At this time we remove the tups, since I would rather have barren ewes which will be fat in spring rather than late lambs.

Early in January troughs are taken to the sheep pasture, and a corn bin to hold half a ton of feed is placed alongside. This saves carrying and ensures that food is on the spot if snow should fall. I firmly believe that extra care and attention given to the flock during January will be well repaid at lambing time.

When trough feeding starts, ½ lb per head per day of the following mixture is given: 30 per cent rolled barley, 20 per cent flaked maize, 20 per cent sweetened palm kernel meal, 15 per cent molassed beet pulp, 15 per cent earthnut meal, plus minerals. This is stepped up to 1 lb in a fortnight, and kept there until the ewes have lambed. In February the flock is brought nearer the farm buildings, extra troughs being put out to avoid overcrowding. In the last week of February the sheep are confined at night to a small grass paddock, close to a stone barn, which is used as a lambing pen.

Lambing starts in March. All lambs are ear-tagged and injected with pulpy kidney vaccine within twenty-four hours of being born. After lambing, the ewes get a few mangolds; roots are never fed before lambing. We always try to avoid one ewe nursing three lambs by fostering on other ewes. Early in April ewes and lambs are set stocked at 5-6 ewes and their lambs to the acre

on land which has been clear of sheep for one year—preferably longer. This land will have had 3-4 cwt of compound fertilizer per acre in early March. Where sheep have been set stocked, no cattle are allowed to run with them. But before going on to set stocking all lambs are weighed to give some indication of which ewes are milking well.

May is the most enjoyable month in the shepherd's year. You just walk round and try to avoid estimating how much the lambs will come to when they are sold! Any surplus grass at the end of the month must be topped off. In June we start to worry again. Top lambs are drawn for slaughter, dead and live weight is recorded. Growth from one month old to killing gives some indication of which is the best and which is the worst tup. During June, ewes which have had their lambs sold off, and which are themselves fat, should be removed from the flock on to bare pasture to prevent them from getting fatter.

Clipping is done sometime in June. It is something of a movable feast, depending on how important it is to get on with silage-making.

About three weeks after clipping all the sheep are dipped. I am sure many shepherds dip their sheep too soon after clipping. That very briefly and simply is the shepherd's year as we follow it.

General observations

To get the best from fat lamb production on a lowland farm, grassland management must be good. If a large number of light or medium weight lambs is the aim, creep grazing might give a better return per acre than set stocking. In our own case we require a very fit lamb of about 50 lb dead weight. That, plus the simplicity of the system, is why we use the set stocking method. We find it saves time and temper to have a catching pen in the sheep pasture. A simple, well-constructed dipping and sorting unit near the farm buildings is also a worthwhile investment. Finally, when moving sheep, never hurry. If you try to rush them along, the job will certainly take longer.

A BOOKLET ON PLOUGHING

The Shell and BP Farm Service, with the co-operation of Ransomes, Sims and Jefferies, Ltd., have produced a booklet entitled *Ploughing—Points the Judge Looks For*, to heighten interest in the skill of competition ploughing.

The booklet, which is illustrated with photographs and diagrams, will be available at certain agricultural shows and ploughing matches free of charge. It can also be obtained from the local Divisional Offices of Shell-Mex and B.P. Ltd., and in Scotland from Scottish Oils and Shell-Mex Ltd.

People who know little about ploughing techniques will be better able to appreciate the skill of the ploughman by studying the book. Learner-ploughmen, too, will find in it a useful guide to the points watched for by judges at competitions.

Some Sheep Handling Pens and Dippers

W. J. BULMER, A.R.I.C.S., Q.A.L.A.S.
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A sheep handling pen which is ideal for one area may need considerable modification before being used elsewhere, but certain basic principles are true for all designs. These are well illustrated in the four sets of pens discussed here.

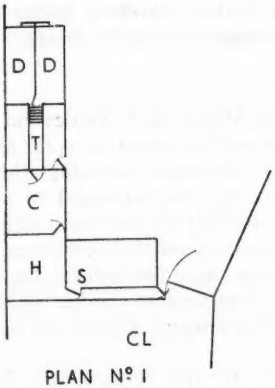
DIPPING and clipping are important but less frequent operations than sorting, culling, dosing, examination of feet and the day-to-day management of a flock, but the same pens must be used for them all. The layout must be cheap enough for a small flock to justify the capital cost, and simple enough for an enterprising farmer to build himself.

At Ingham House Farm, Hanlith, Mr. F. E. Muller, the owner-occupier, has a conventional layout (Plan 1). The fences are of creosoted wood, and the design fits neatly into the corner of a croft where he can gather the sheep in the yard of an outbarn. They then move forward easily into the catching pen, which in this case is square. Pens are so placed that the sheep move towards the moor in the same direction as when turned back to their natural grazing. The draining pens are arranged side by side, and have guillotine gates at the exit so that the sheep can be released after draining without the man who is dipping moving from the edge of the tub. The mechanism controlling these gates has given some trouble in spite of the care taken in construction, so that they can at times be more of a hindrance than a help.

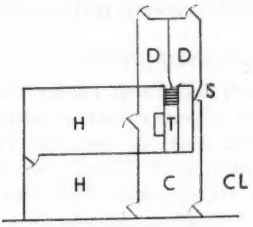
A notable point is that the main gate from the yard can be used with the first gate to the pens to form a simple and very effective shedder, so that stray sheep from other hill flocks can be segregated straight away, before entering the first pen. The second shedding gate and the pen it feeds have been added recently. This pen can be used for any sheep which have to be held for some time while the main flock is being handled. There is no foot-bath fitted, but a bath could easily be put in alongside the tub if it should ever be needed. This layout is excellent for dipping, but it is only the alterations made since it was put up, and the special use of the first gate, which make it possible to use these pens for handling when the sheep are not being dipped.

A second layout (Plan 2) is found at Black Bank Farm, Austwick, where Mr. and Mrs. McCrae have built a complete outfit for their tenant, Mr. Airey, at the amazingly small cost of £210. All the pens are concreted and the walls are rendered concrete blocks. The sheep are gathered in the yard to the outbarn, and the circulation is unusual in that they pass through the catching pen into the two holding pens. These are big enough to hold all the sheep to be dipped. Many experienced sheep men might think that it would be difficult to get sheep to run through the catching pen, but practice has shown that they go through easily, and once in the holding pens they go back into the catching pen easily. It could be argued that this pen is bigger than it should be for easy catching, but no great difficulty has been found in practice. A foot-bath could easily be fitted in the shedding race, or between the tub and the shedding race, if necessary. Mr. Airey has never found it a disadvantage that he only has one shedding point and that it leads back to his collecting yard. This

SOME SHEEP HANDLING PENS AND DIPPERS



PLAN Nº 1



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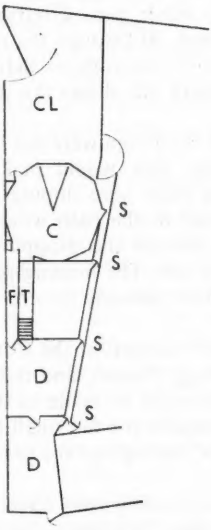

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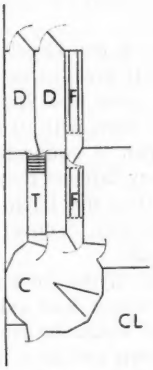
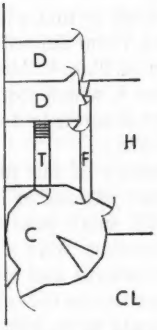
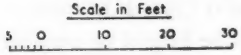


PLAN Nº 4



PLAN Nº 5

CL	Collecting
H	Holding
C	Catching
T	Tub
F	Footbath
D	Draining
S	Shedding



points the moral that it is only after a sheep-handling layout has been improved that anyone realizes the advantages of a better design.

Successful adaptation

At Flasby Hall Farm, Flasby, Gargrave, Messrs. R. T. Swales and Son have made a set of pens round an existing tub and incorporated as far as possible the existing areas of concrete (Plan 3). Although the adaptation of the existing equipment limited their choice they have managed to produce a first-class arrangement. This was demonstrated by the astonishing feat of dipping 73 shearlings, dosing 35 lambs, shedding over five score shearlings and lambs twice through, and putting the same sheep through the foot-bath, all in 45 minutes. Such a performance shows how smooth was the running of the sheep through the pens; the shearlings were properly dipped and none of the work was skimped.

A circular forcing pen largely accounts for this performance. The round pen is also used with great success for lambs, which can be handled and dosed with noteworthy care and speed, but Messrs. Swales attach even more importance to the race, with its large number of shedding points, and to the fact that every pen is connected with every other pen. Contrary to the experience of many farmers they find their sheep go through the race more easily down hill than up. Each shedding gate is reversible so that the race can be used either way. A cover over the dipping tub allows this area to be used as an extra pen.

Having used this layout for a season, and if the design were not hampered by the existing layout and existing buildings, they would make certain changes. The race would be even better if the sides were sloping to ensure that lambs go down one at a time; a lip fitted to the bath would greatly reduce the amount of spill; a sump would prevent the droppings in the draining pen from being washed back into the tub. The holding pen before the round catching pen is too big. They are now reducing its size so that it can be filled even more easily.

There is little fault to find with the design of the pens at the Cumberland and Westmorland Farm School at Newton Rigg, Penrith, and the essential points are shown in Plan 4. Alterations which could be made to the layout are shown in Plan 5, which would be more suitable for the small flock and ensure that all the concrete laid would be useful throughout the year and not only at dipping time.

An unusual feature of this plan is that the draining pens have been put one after the other, instead of being side by side. The reason for this is to provide two useful small pens for sorting rather than two which have no use except for draining. With a gate into the race, the man who is dipping can easily move forward and release the front pen first, and then loose the sheep from the pen nearer the tub into the front pen to complete the draining process; there should be no difficulty in the sheep moving away from the tub. The dip from the front pen drains through the pen nearer the tub into a sump, and then returns to the tub. A cover over the tub and the gate makes yet another shedding point.

Costs of a typical layout

It may be helpful to consider the costs of a typical layout of this kind.

If we take Plan 5 and assume that the ground is adequate to take concrete without hardcore, then the standard costs will work out something like this:

	£	s.	d.
Concrete, 56 sq. yards at 9*s.* 9*d.*	27	6	0
Bath, say 140 gals at 2*s.* 1*d.*	14	11	8
Fencing, 55 yards 3 rail at 8*s.*	22	0	0
55 yards 4th rail at 1*s.*	2	15	0
Gates, 7 at 3 ft. 6 in. 2 at 5 ft. 0 in. 2 at 8 ft. 0 in. } 50 ft. at 11*s.*	27	10	0
	94	2	8

This shows the cost excluding contractor's overheads and profit.

Depending on the breed, 4-5 sq. feet of pen room is needed per sheep; the width of the race should be between 15 and 18 inches, again depending on the breed handled; and careful consideration should be given to making the race with sloping sides down to 12 inches wide at the floor, although this leads to complications when making shedding gates from the race. The tub should hold ½ gallon per head of the total flock, with 140 gallons as a minimum. In practice it may be possible to manage with a smaller tub with the smaller breeds of sheep, but most people try to manage with a tub which is too small; the dip fouls quickly and in consequence the operation loses in efficiency. Any shape of tub can be used without altering the essential features of the design. The fencing suggested is 3 ft. 6 inches high, made up of 4 × 4 inch posts at 4 feet centres, with four rails each 3½ × 1½ inches.

Pollution by dip is dangerous

One cannot give too much attention to the disposal of the dip, which can be put into a good soak-away only if it will not eventually find its way into a water supply or a watercourse. On no account should a soak-away be used in limestone country, where underground watercourses can carry the pollution for a matter of miles. The local authorities in many areas are prepared to remove the dip and dispose of it safely, and they should be consulted when planning the layout. There may be some waste ground on the farm where it is possible to spread the dip on the surface, but if this done continually in one place and there are trees about they may be killed.

The plans are to scale, but the size of the layout is entirely a question of the size of the flock. So long as the circular catching pen is about 15 feet in diameter and the capacity of the draining pens is adjusted so that each holds about half the number of sheep that can be contained in the catching pen, the other dimensions may be made to fit the individual needs of the flock.

Hill Sheep and the Veterinary Investigation Service

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Veterinary Investigation Officer, Cumberland

A summary of the ways in which the Ministry of Agriculture's Veterinary Investigation Service is trying to help the hill shepherd.

ALTHOUGH much has been done in the past, and much continues to be done, to improve our hill land, it is unlikely, because of climatic conditions, that it will ever be widely used for growing arable crops. At present, and in the foreseeable future, the hills are most suited to raising sheep and cattle. In the high hills, sheep are the more suitable animals.

It is often assumed that diseases of domestic animals are mainly a result of man's interference with Nature, and this assumption may have some basis of fact in cases where production has been forced to high levels. An argument against the theory was found when the disease position in hill sheep was investigated. For a domesticated animal, the life of a hill sheep very closely approaches that of its wild counterpart, but in spite of this it suffers from a great variety of diseases, and losses in hill flocks were very high indeed when they were investigated during the 1940s.

Surveying the incidence of disease in hill flocks was not easy, and diagnosing the cause of all deaths was found to be impossible because many sheep which die on the high hills are not found until *post mortem* changes have made them useless for diagnosis. It was clear, however, that losses (including deaths) in hill flocks were surprisingly high.

Sixty-four deaths per hundred sales

Figures produced by one very detailed survey showed, among other things, that 64 hill sheep died for every 100 which were sold during a five-year period. Using a different method of getting the figures, and during another five-year period, it was estimated that for every 100 lb of mutton sold off the hills 55·4 lb were lost because of deaths. The close agreement of the results of two methods used at different times suggests that the losses quoted may be a fairly true reflection of what actually happens in hill flocks.

The causes of these rather startlingly high losses are still partly a matter for speculation. Difficulties of carrying a sheep down from high hills, added to the speed of post-mortem changes in sheep, result in the list of diagnoses from hill flocks being heavily weighted by the "no diagnoses" section. Sheep which die on the hill tops might alter the picture if they could be obtained for autopsy; a big proportion of them may die because of disease which is not common on the lower slopes. But ignoring the unavoidable error which may be introduced by the "no diagnosis" column, it appears that the main causes of death were: diseases associated with anaerobic bacteria (mainly pulpy kidney, braxy, blackleg and black disease), worm and fluke diseases, and metabolic diseases (chiefly low blood levels of calcium and magnesium and twin lamb disease).

This, then, was the position regarding diseases which kill; but deaths might not be the only, or even the greatest, cause of loss to hill shepherds. Some of the information which was collected during disease survey work did not suggest that all would have been well with hill sheep even if the death rate had been lower. Particularly, it was evident that most hill shepherds were satisfied with an 80 per cent lamb crop, and many of the flocks never reached even this very modest figure. Scottish Blackface in Scotland averaged a lambing percentage of only sixty.

Weighing hill sheep produced some surprising figures. Well-grown hoggs constantly lost, on average, 10-15 lb during the winter, and losses of up to 42 lb were recorded. Even in Welsh Mountain lambs weighing only some 40 lb, losses of up to 5 lb per head were not uncommon. Pregnant ewes, instead of gaining up to 14 lb during the last weeks of pregnancy, not uncommonly lost weight during this period; these ewes produced light lambs, and viability appears to be very closely connected with birth weight.

Veterinary surgeons well know that diagnosis may be easier than therapy. This has been the case with the Investigation Service and hill shepherds. By 1950 it was realized that about 30-40 of every 100 hill sheep die before they can be sold and that the 60-70 which do not die are not as heavy as they should be. The lambing crop was distressingly small. Had this been the position on lowland farms, practising veterinary surgeons would almost certainly have been aware of it, and could have taken steps to prevent some of the losses and given advice on how to get heavier sheep. Hill farmers, on the other hand, tended to do much of their own veterinary work, particularly as far as sheep were concerned. If this situation had continued the Investigation Service could have done little to help hill shepherds because it only gets on to the farm when it is called in by a practising veterinary surgeon. Fortunately, hill farming became more profitable and the price of hill sheep made veterinary attention a paying proposition for the farmer.

Papers published in scientific journals drew the attention of veterinary surgeons to the amount of loss sustained by hill farmers and indicated the most probable causes of the losses. The veterinary surgeons played their part, and most hill farmers now know that the veterinary surgeon can help in the prevention of deaths in their flocks, though the price of hill sheep is still low enough to make veterinary attention to individual animals of doubtful value. When flock problems arise, the veterinary surgeon can be, and generally is realized to be, a tower of strength.

Laboratory and field work

As was mentioned above, the main causes of death in hill sheep are diseases associated with anaerobic bacteria, worm and fluke infestation, and metabolic upsets. There is now little excuse for any shepherd having anaerobic diseases as a problem; excellent vaccines have been developed, and where they are used under veterinary supervision results are almost perfect. Much of the work involved in developing these vaccines was carried out by laboratory staff.

Before a practitioner can advise on the type of vaccine to be used, he must diagnose the disease which is killing the sheep. Laboratory help is essential for this purpose, and investigation centres in hill areas have provided the means by which this can be given.

With the parasitic and metabolic diseases, preventive measures have not been so easy. New knowledge about these conditions is increasing, and it may one day be possible to deal with them more satisfactorily. At present, advice can be offered which will markedly reduce the incidence of these diseases, but prevention, as yet, is impossible.

Recent work has made it possible to forecast the onset of bad years for liver fluke disease. In Wales especially, farmers are now being warned when concentrations of flukes on the pastures will become dangerously high. This makes it possible for most farmers to prevent serious outbreaks of disease.

The field staff of the Ministry of Agriculture devoted many hours of rather tedious labour to the eradication of sheep scab but, with the old arsenical dips, total eradication was a will o' the wisp; it was almost immediate when the single dipping type of dip came on to the market. Older hill shepherds will probably always have a soft spot for the Investigation Service, since it was they who evolved and carried out the original trials on these dips. When scab had been diagnosed, every sheep had to be collected from all the surrounding hills—and you need not be a keen rock climber to realize what a monumental task this was.

Winter feeding for bigger lamb crops

Many Veterinary Investigation Officers who are stationed in hill areas are at present concerned with the problem of making hill sheep more productive. From experimental work and a study of hill farms which produce lamb crops of up to 130 per cent, it has become fairly clear that hill sheep need some supplementary food during the winter. In the summer, stocking of the hills may be as low as one sheep to five or even ten acres, though the pasture could carry many more than this. From January to April, one sheep to ten acres represents gross overstocking on most fells. It seems probable that the hill flocks of Great Britain could be increased enormously if additional food were provided during the winter months. This suggestion was put to the shepherds, but it did not appeal to them at all.

Most hill shepherds are men of profound knowledge but conservative outlook. Lack of money in pre-war days made it difficult for them to make any real effort to improve output and, in any case, the price of hill sheep was so low that there was little incentive to do better. There developed a tendency to regard preservation of the *status quo* as a virtue, and this attitude for some time prevented the Investigation Service from convincing any but the younger shepherds of the need to provide food. Gradually, however, hill farmers are beginning to feed hay and even concentrates to their sheep during hard weather in late winter. If this practice continues, the lamb crops will become bigger, and fewer lambs will die.

During the last two decades, then, losses from disease in hill sheep have been reduced, sheep scab has been eradicated, and hill sheep have begun to eat during the late winter months. In the last resort, of course, it is the hill shepherd upon whom the hill sheep depend, but the Veterinary Investigation Service has played, and continues to play, a worthwhile part in helping him to do a good job.

The Breeder and A.I.

L. E. ROWSON, O.B.E., M.R.C.V.S.

Cambridge and District Cattle Breeders Limited

Mr. Rowson describes the progress of progeny-testing at the Cambridge Artificial Insemination Centre, and advocates the formation of breeders' syndicates, through which such testing could be wider spread.

It is almost twenty years since the first Artificial Insemination Centre was established in Great Britain, and the progress of A.I. has been quite phenomenal. Most people would probably agree that it has expanded too fast to succeed completely in its original purpose, but it has, nevertheless, usefully provided a cheap and efficient method for the smaller farmer to get his cows into calf. This purpose alone has amply justified it.

There can be no doubt, however, that the initial results did not improve livestock as much as had been hoped. They emphasized the fact that pedigree and even performance in a single herd were extremely unreliable guides to a bull's ability to increase yields even in our lower-yielding herds. One of the most interesting points brought to light by these early results was that good bulls tended to lift yields at all levels, and not merely in the lower-yielding herds. This showed fairly strongly that the main difference between the poorer and better herds was not genetic at all but a matter of management. Poor management was limiting milk yields in the lower-yielding herds and would do so even if better-bred cows were introduced. But the object of livestock improvement is not only to obtain high yields, but to breed animals capable of a higher performance under fixed management.

Urgent need met for planned progeny testing

It quickly became obvious that some planned form of testing of bulls at A.I. centres was an urgent necessity. In 1952 the Cambridge A.I. Centre and the Agricultural Research Council formulated a planned progeny testing programme which was to be carried out in the form of a ten-year experiment, directed jointly by Dr. Alan Robertson of the Genetics Institute of Edinburgh and the Cambridge Centre.

It was decided that the main scheme would be confined to Friesians, because a high proportion of the milk-recorded cows in the area covered were of that breed. The principle of the scheme was that groups of four yearling bulls should be bought each autumn, and used until at least 200 recorded cows were in calf to each bull. The bulls were then removed from the Centre, and the following autumn a further group was brought in for testing.

As soon as the daughters of the first group reached service age, each bull was mated to twenty of his own offspring, to discover undesirable recessives. Out of the 200 recorded cows in calf to each bull one could expect around 40 heifers to complete their first lactation, the remainder of the calves being lost as bulls, abortions, calf mortality, sales etc. The comparative test of each bull's genetic value was, therefore, based in the beginning on the relative performance of his first 40 daughters. The daughters of each bull were,

therefore, compared for yield, fat and conformation, not only against each other but against any other bull's daughters which were being milked in the herds in question the same year. Thus management factors were ironed out, and this contemporary comparison method is now widely recognized as a valuable means of overcoming the difficulties of assessment where management conditions are constantly changing.

The best bull according to this analysis is brought back to the Centre and used heavily as a proven animal. The proven sire is mated to selected cows to produce one or more young bulls which themselves can be put through the testing process. This plan is repeated year by year, until gradually a group of proven sires is obtained and further selection can be made, based on additional factors such as later lactation, longevity, udder wear and so on. At this stage it becomes possible to breed sons from only the best bulls. The effectiveness of the scheme is, therefore, increased as it progresses.

The test so far

So far, the picture given by this particular scheme is as follows:

First year. Only three bulls were available, and these produced the following production data on their daughters: Bull A −25 gallons, bull B +53 gallons and bull C +5 gallons. Bulls A and C were therefore destroyed and bull B brought back to the Centre for heavy use and for producing one or more sons for testing. One son is in fact under test at this moment.

Second year. Four bulls were used and gave the following results: Bull A −53 gallons, bull B −70 gallons, bull C +4 gallons and bull D +69 gallons. Bull D was therefore brought back and used heavily. Sons of his will be due for testing next year.

Third year. Again four bulls were tested: Bull A +87 gallons, bull B −40 gallons, bull C +16 gallons and bull D +24 gallons.

Bull A was therefore brought back for heavy use, and has been mated to cows for producing sons for testing.

The fourth year group is at the moment being assessed, and a further bull may be brought back for heavy use.

In order to make full use of any of the bulls which are tested, a stock of frozen semen is put into store while the bulls are at the Centre. If one should prove superior, sons can still be produced after he has left the Centre and the remaining stocks used for routine inseminations. Such a scheme could lead in time to a degree of inbreeding which would necessitate the introduction of outside blood, but the operation of similar closed schemes throughout the country and the interchange of the best sires could only be of great benefit.

The attitude of breeders to A.I. has varied from outright opposition to wholehearted co-operation. The accent in the early days was certainly on opposition; but breeding can be revolutionized if the lessons of the past twenty years are learned and applied.

In the scheme considered above it has taken 800 cows to progeny-test 4 bulls, and this is considered a minimum unless mistakes are going to occur. What herd in the country can provide this number of animals for testing, let alone for mating to any proven bull which may be found? There is, moreover, another danger in a small unit. In any one year four really bad bulls might be found, yet because of the contemporary comparison one animal might stand out above the others and therefore be used heavily as a proven bull, despite

the fact that he would be genetically inferior. Because of the wider spread of A.I. bulls' progeny, each bull's daughters are compared against those of a very large number of other animals and such a mistake is much less likely.

Syndicates for testing

The only solution for the breeder is to join with others, in co-operation with an A.I. centre, to form units of sufficient size to carry out similar testing schemes, each member keeping a young bull and distributing semen to the others so that a proportion of each herd is inseminated with each animal. In this way the best bull will undoubtedly be found, and it is then that the trouble could begin. Everyone naturally wants to put all his cows to this animal, and the number of cows for testing may decline to an unworkable level unless rigid rules are drawn up before operations start. There will inevitably be the temptation to mate all the best animals to the proven bulls and reserve the poorer ones for testing purposes. These points should be considered in detail in any such scheme: if any member constantly broke the rules he would presumably be excluded from the unit.

There is little point in forming such units, finding a good proven bull and then leaving the matter there. If there is to be continuous and consistent improvement in the breed, the process must be repeated year by year and further selections from the proven bulls made in the light of the performance of daughters in subsequent lactations. At long last a few of the breed societies are encouraging the development of such units.

Beef breeds stand aside

The position of beef bulls in A.I. is an unhappy one. The numbers of inseminations carried out annually by beef bulls crossed with dairy cows has increased tremendously over the past ten years, yet it is doubtful if any beef bull in any A.I. centre is either performance or progeny-tested. There is a very great need for testing schemes, probably making use of mobile weigh-bridges, to follow up the result of these beef crossings. The beef breed societies have, until recently, virtually ignored A.I., yet beef breeders could just as easily use it to find the best bulls as the dairy breed societies are now doing. By refusing to register A.I. progeny the beef breeds are practically throwing away a valuable method of assessing the genetic value of their bulls. Sooner or later this will rebound on them, as overseas countries can sell semen from progeny-tested bulls or produce progeny data on their animals before sale.

Individually, breeders almost unanimously favour schemes of co-operation for progeny-testing beef bulls, even if they involve the use of A.I., and it is a little difficult to understand why the Councils of their societies have persisted in opposing the technique. The A.I. centres have no axe to grind in this whatsoever. They are free to use beef bulls on all unregistered stock, and the loss by not inseminating pedigree cattle is negligible; but it is a tragic waste of opportunity for the present attitude to continue. Beef bulls can be tested so easily, as both males and females can be used, and the contemporary comparison method—provided it is based on a wider scatter of offspring—could probably be applied effectively without any elaborate arrangements or expenditure other than the provision of a few mobile weighbridges.

Waste Foods - A Source of Disease

JAMES L. SHAW, M.R.C.V.S.
Ministry of Agriculture, Fisheries and Food

Mr. Shaw describes some of the hazards to livestock encountered where waste food is fed. All of them have been the cause of outbreaks of disease. Many of them could have been avoided with a little care or thought.

UNBOILED waste food has for years been branded as a danger by the law that forbids its being fed to animals untreated. Nevertheless, imperfectly treated swill fed to pigs is probably the main source of infection in this country of the primary outbreaks of foot-and-mouth disease, swine fever and fowl pest.

Outbreaks of disease, like forest fires, start as often as not from the careless spark. The extent to which they spread and the amount of damage they cause largely depends on how soon they are detected and the amount of susceptible material near by. If serious outbreaks are to be avoided, we must learn from past experience.

From 1st January 1960 to 15th April 1961, 399 outbreaks of foot-and-mouth disease were confirmed in Great Britain. Forty-two of these were "primary"—having no known connection with any other outbreak. These 42 gave rise to 357 secondary outbreaks. The origin of infection in the primary cases is thought to have been as follows:

Imported meat or bones, and swill	23
Obscure	18
Research Laboratory	1

During this period, none of the obscure cases was considered to be due to birds and wind currents from the continent of Europe—the main source of primary infection in the 1951-52 epidemic. The 1960-61 series of outbreaks of foot-and-mouth disease was apparently caused by the presence of the causal virus in waste food, and we can only assume that susceptible animals came into contact with such material either through ignorance, thoughtlessness or neglect. When most of the primary cases of swine fever and fowl pest can also be attributed to the same cause, the case for precautionary measures is made even stronger.

This contingency was first legislated for in 1927. The Diseases of Animals (Waste Foods) Order 1957 is based on the experience and knowledge gained from the operation of the earlier Orders and is the one now in force. This Order, extremely difficult to enforce in every case, is largely dependent for success on its voluntary observance.

Nearly everyone who feeds swill to pigs knows that the law requires it to be boiled before being fed. Many believe that their statutory duty ends there. Few, if any, have read the actual Order, and just as few have had it explained to them. The need to explain the dangers of spreading animal diseases through infected waste foods is vital.

Why waste foods are dangerous

Foot-and-mouth disease is not endemic in this country. Every time the disease has broken out it has been eliminated. Infection is invariably imported

from abroad. Measures have long been taken to prohibit or control imports of animals, carcasses and meat. The ideal would be the total prohibition of these commodities, or failing that to limit such importations to countries where foot-and-mouth disease does not exist. Unfortunately we have to import carcasses from countries where the disease is endemic—notably in S. America—because we cannot be self-supporting in meat.

Before such imports are accepted, certain stringent control arrangements are agreed to by the exporting countries in an effort to prevent infected meat from being exported. But these arrangements cannot wholly avert the risk that meat may occasionally be exported from animals that were incubating the disease at time of slaughter. Such meat is highly infective if in the untreated state it comes into contact with susceptible animals, even though it has been reduced to a sliver of trimming discarded from the weekend joint. Bones from such a carcass are particularly dangerous, the virus lying hidden and protected in the marrow—a veritable "Trojan horse" within the gates. The same applies to swine fever and fowl pest. These diseases, no doubt introduced from abroad in the first instance, have established a stubborn foothold in this country, with the result that their presence in swill is an even more constant threat than foot-and-mouth disease.

The first and most important point for a stock-owner to realize is that as soon as swill enters his premises he is handling material potentially dangerous to his animals and poultry. Not every bin contains infective meat, but in so far as no warning notice can be given it must be assumed that it does. In this respect it might be mentioned that when foot-and-mouth disease breaks out in pigs in this country it is seldom limited to a single primary outbreak. Other primary cases occur, not necessarily in the same district or even the same county. When this happens it usually signifies that a shipment containing infective carcasses has recently been distributed to the retail trade and that infective swill is in circulation. Every swill feeder should maintain the highest standard of precautions at all times.

Very broadly, the danger arises in two ways. One is that contaminated food, insufficiently sterilized, may be fed to pigs in swill. The other is that it may be left where susceptible animals may have accidental access to it, or where birds, dogs, cats or vermin may get at it and drop pieces within reach of susceptible animals. The Diseases of Animals (Waste Foods) Order 1957 deals with these two points in detail; and indeed if the Order was always strictly observed, no other precaution would be necessary.

What the law requires

Many stock-owners believe that the Waste Food Order applies only to "swill collectors", who take the kitchen waste from such places as Service camps, schools, hospitals, hotels, restaurants and other catering establishments. The Order is quite specific and states: "no person shall use any waste foods to which this Order applies for feeding to animals or poultry unless the waste foods (*a*) have been boiled." The meaning of waste foods to which the Order applies is also defined:

> "(*a*) Any meat, bones, offal or other part of the carcass of any animal or of any poultry;
> "(*b*) Any broken or waste foodstuffs (including table or kitchen refuse, scraps or waste) which contain or have been in contact with any meat, bones or offal or with any other part of the carcass of any animal or poultry."

The mesh of the safety net is indeed a close one, designed to protect the cottager's pig from the danger that lurks in the pail below the kitchen sink as well as the many pigs fed on canteen swill.

Another misconception is that because most of the waste food collected consists of left-overs from cooked meals, no further boiling is necessary. Where swill is collected in any quantity it is the rule rather than the exception to find scraps of raw meat and bones in such swill.

In one of the recent outbreaks of foot-and-mouth disease, a country hotel disposed of its kitchen waste by dumping it over the garden wall into a field occupied by bullocks and sheep. The excuse given was that it contained only vegetable refuse and left-overs from cooked meals. The proof of the pudding was in the eating of it. Unfortunately it was left to the bullocks to verify this—to their detriment.

Meaning of "boiled"

The Order is also careful to define the meaning of "boiled": "boiled means exposed for at least one hour to a temperature of not less than 212°F". The equipment used for this purpose can vary from a kitchen copper to a modern steam digester. In fact, within limits, the smaller and more simple the boiler the less chance there is of a breakdown and the easier it is for the operator to be sure that all the contents are boiling. Many of the plants consist of large tanks or vats into which is inserted a live steam injection pipe. This form of boiling can be very efficient if properly applied, but highly misleading if not. Random checks using a thermometer have shown that, in many cases where a single jet per tank is used only a very small area of swill surrounding the actual jet outlet ever reaches the required temperature. In some plants it was possible to plunge the arm into the swill outside this area without discomfort. The plant and equipment may be licensed as adequate, but unless the operator is both conscientious and fully aware of the dangers in the material he is handling, the system can break down. A temporary shortage of fuel, a frozen inlet pipe to the steam boiler, or the shortcomings of the temporary staff employed at weekends and public holidays has caused many an outbreak of disease. In these circumstances it is safer to let the pigs go short or to risk slight digestive disturbances by feeding meal than to feed unboiled swill, with the consequent disease risk.

Precautions to be taken before and after boiling

As stated previously, many stock-owners, having boiled the waste food, believe that their statutory duty has been accomplished, but the Order also states that all reasonable steps must be taken to prevent the unboiled waste foods from coming into contact with the boiled waste food and from being accessible to animals and poultry. Non-compliance with this requirement presents the greatest danger of all. Galvanized bins used for collection are notorious for the ease with which they become misshapen; lids then become a liability and are discarded; the bins sit uncovered in the yard for dogs, cats, poultry and wild birds to help themselves, and scraps are dragged and dropped within reach of the farm stock. The only reasonable precaution to be adopted is the construction of a storage compound which is both animal and bird proof. Faced with this proposition, many owners argue that the animals

never have access to the yard or to the swill, and yet a very common practice is to turn the pigs out of their pens into the yard to facilitate "mucking out". When this is pointed out to owners they quite often admit that they had never thought of that point. One member of the pig family which is often overlooked is the dry sow; turned out into the paddock with an open shed for shelter, she is allowed a freedom denied other farm animals. Born with an instinct to forage, an omnivorous appetite and a snout capable of lifting a gate or overturning a bin, she presents a menace where proper storage precautions are lacking. Such a situation presented itself in February of this year, and as a result eight counties suffered 62 outbreaks of foot-and-mouth disease before the epidemic was stamped out.

Spillage of unboiled waste food around the tanks is a common occurrence, with the result that pieces of meat are picked up on the workers' boots and trailed into the pens. Very frequently it has been found that the pigs showing earliest symptoms of disease are those in pens nearest these tanks. One employee admitted that after brushing up around the tanks, he was in the habit of throwing the sweepings into the nearest pen.

Disinfect the collection vehicle

The actual vehicle used for the collection of swill can also be overlooked as a focus of infection. This vehicle is used for the transport of pigs on market days, carries the sows to the boar, and on mixed farms is used generally on or about the farm for the carriage of meals, hay etc. Odd scraps of waste food can then be picked up by any susceptible animals subsequently transported, or contaminate the fodder carried. The Order makes it quite clear that after carriage of waste foods, the vehicle and bins shall be thoroughly disinfected before being used for any other purpose.

Special personal precautions should also be taken where the same stockman is handling swill and tending cattle or sheep. Utensils, pails, shovels, brushes etc. should be kept apart. In one outbreak wooden boxes and wrappers which had contained imported frozen pork had been brought up from the piggery to light the dairy boiler. Disease in this case, not surprisingly, broke out in the dairy cows, despite the fact that the cattleman had no connection with the piggery, which was separated from the cowsheds by over one mile.

★ NEXT MONTH ★

Some articles of outstanding interest

AUTUMN GRASS *by J. D. Ivins*

LOOKING TO THE LAMB CROP *by J. E. Nichols*

MENACE OF CORROSION *by I. G. Slater*

POTATO STORAGE *by P. T. G. Twiss*

WATERCRESS FOR MARKET *by H. F. Gardner*

Museum of English Rural Life

NIGEL HARVEY

The Museum of English Rural Life at Reading has recently celebrated its tenth birthday. This article describes the scope and resources of this national centre for the preservation and study of our rural past.

IN the last fifty years, change has come to the countryside as the tides come to the beach, ceaseless and irresistible, altering, submerging, eroding. Decade by decade, new technologies make obsolete whole ranges of farm equipment and farm lore. Decade by decade, more and more of our past fades into history. There is, or was until recently, a great deal in English country life that was older than the Industrial Revolution, older than the Enlightenment, sometimes older than the Conversion itself. But in our own time, so drastic and pervading are the changes brought by the twentieth century, much of it has gone and much of the rest is going. As for the proof of these things, read Flora Thompson's *Lark Rise to Candleford* or Laurie Lee's *Cider with Rosie*. The former was published in 1945, the latter only a couple of years ago, and both are in large measure autobiographical. But the manner of life and the methods of farming they describe are almost as remote from us as the plodding oxen, the wooden ploughs and the hedgeless fields of the older agricultural order.

The most striking index of the rate of this general revolution is the destruction of the physical equipment of the past. A couple of lifetimes ago, for example, there were flails on every farm. Today the flails that survive can probably be counted in hundreds. And with the old tools inevitably go the old skills. There can be few men left in England who could run a windmill. In the near future there will be few left who could harness and drive a horse-team. But it is also a question of vanishing customs, beliefs, traditions. It is still possible to meet countrymen who, when young, consulted the local "wise man", watched a mummer-play or heard from their elders stories that were not wholly stories of the black dog of the moorlands and the shadowy hunters who met on Midsummer Eve at the standing stone. But it will not be possible much longer. Indeed, our rural inheritance is passing from us rapidly and irrevocably. The need for the systematic collection and conservation of material which will enable our successors to understand something of the rural life of their forefathers is obvious.

Of course, there has long been a network of museums, societies and individuals concerned with the history of the countryside; and we owe them a very great debt indeed. But some are restricted to particular areas or particular subjects, while others can devote only part of their resources to specifically rural material. So, as the years passed and the rate of change in the countryside increased, the case for a really *national* centre devoted entirely to our rural past became steadily stronger. And finally the need produced the institution, the Museum of English Rural Life, which was established by the University of Reading in 1951 and first opened its doors to the public four years later.

In principle, the function of this Museum, as of any other, is simple. It exists to preserve and increase knowledge, in this case knowledge of rural

history. But its practice is more complicated. It collects and displays objects of historical interest. It collects documentary information. It undertakes systematic studies and recordings of particular subjects. Consequently it is a centre of information and research as well as the home of an exhibition. Nevertheless, it is right to start with the exhibition, for this is the means whereby we are introduced to its theme and resources.

The first room of the Museum takes us through the farming year, starting very properly with ploughs, continuing via harrows and hoes, sickles and scythes, and ending, equally properly, with flails and windmills. Livestock, less amenable to historical presentation, are mainly represented by such equipment as harness, sheepbells, and shoes for horses and oxen. But it is significant that no more than a third of the floor space is occupied by agricultural relics, for in Old England farming was only one trade among many. The village depended on its craftsmen as well as its farmers. So the second room shows us the tools and products of the smith, the carpenter, the wainwright and their various brethren in that technical aristocracy whose destruction by the factory system robbed the countryside of so valuable a source of wealth, variety and leadership. The third room reminds us that the countryman was only half the rural population and that the rural housewife was the economic as well as the domestic partner of her hard-working husband. She certainly cooked and laundered, but she also baked and brewed, spun and wove, made candles and worked in the dairy. Indeed farmhouse and cottage alike were a mixture of home and workshop.

Today these exhibits stand neatly labelled in comfortable, well-lit rooms, clean and bright from the treatment they have received in the repair department, which is one of the prides of the Museum. But they tell an unmistakable tale of the harsh, crude, tireless society which produced them. For they all came from a countryside wherein the only mechanical power was the limited harnessing of wind and water and where all work save grinding was done by the muscles of men and of animals and all things were made one at a time, by hand. The life of this countryside depended on human labour of a sustained intensity beyond modern conception, most of it under conditions of extreme discomfort. Until within living memory, men and women alike worked their long hours outdoors without waterproof clothing or rubber boots and indoors with poor heating and poorer lighting. The general domestic standards of most cottagers were well below those of a modern army on campaign.

For the old village community could draw only on such local resources as nature provided or man had developed. It built its own houses from local timber, stone, clay and straw. It clothed and shod itself with the wool and skins of its stock, which it processed itself. It raised its own animal power and fuelled it with food of its own growing. Even its science, the inherited lore preserved in jingle and proverb, was local. Such self-sufficiency bred patience, skill and frugality. It did not breed wealth or comfort.

Nevertheless, this restricted economy preserved and exploited one asset which we have forgotten. This was the Waste, the surviving areas of primeval England which provided the villagers with fish and fowl, firewood and rough grazing. The eel-fork in the Museum recalls the days of the green wilderness, rich in wild life, which once lay around every settlement. So, less agreeably, do the man-traps and the alarm-guns. The Waste vanished into private

hands, but the needs it served and the habits it created did not end with it.

In terms of years, many of these exhibits are not so very old. But they all take us back to a rural England very different from the countryside we now see around us. They take us back to a manner of life, to a set of physical assumptions, which has now perished in these islands, though you will still occasionally glimpse it in the remoter parts of Europe. The cottagers who made and used these tools had more in common with the people in Breughel's pictures than with those who live in our villages today.

But the exhibits themselves tell us only part of the story. Taken alone, they are no more than curios. It is only when their purposes, origins and provenance have been recorded and collated as fully as the available information allows that they become historical evidence, part of the material from which the past can be reconstructed. So every object which enters the museum has to answer a long and detailed catechism before it can take its proper place in the comity of exhibits. Its background is noted, it is measured and photographed, its local names are entered in a dialect index, the parish from which it came is entered in a geographical register, and a bibliographical note on relevant sources of information prepared. There can be few better sources of knowledge of the life and work of our ancestors than the card-index of this collection.

Documentary wealth of the Museum

This card-index, however, is only part of the documentary wealth which the Museum collects and organizes. Books, papers, letters, advertisements, bills, account books, illustrations of all kinds, tape-recordings, nothing rural is foreign to it. Many of these come as gifts or loans. Only recently, for instance, the Museum has acquired a series of photographs showing the different types of coracle used in Britain in the nineteen-twenties and a collection of letters by Thomas Harding of Somerset, a Victorian cheesemaker who was largely responsible for the development of Cheddar cheese. But others are the result of deliberate investigation, for one of the main functions of the Museum is research.

This research takes various forms. For example, the detailed recording on film of six rural crafts, operation by operation, has now been completed, the photographer concentrating on the craftsman's hands to show exactly how each tool is used and what it accomplishes. Then again, a national study of farm wagons has been undertaken. Nearly five hundred wagons were located by appeals in the press, every one was seen, photographed and measured and its construction and use described, the resultant mass of information being analysed to show the regional distribution of the various types of wagon. And at the present moment a detailed survey of two Berkshire parishes and a more general investigation into farm buildings are in progress. Thus does the Museum preserve material that would otherwise perish, forgotten, in a few years. In this task it receives much welcome help from members of the public, from farmers, local historians and others interested, and it is pleasant to see in a recent annual report a special tribute to the generous support given by members of the N.A.A.S.

The value of this alliance between historian and present-day practitioner was illustrated with peculiar force in the exhibition of grassland husbandry

since the seventeenth century that the Museum organized in honour of the eighth International Grassland Congress which met at Reading in 1960. For it needs both technical and professional knowledge to assess the different parts played in the long, complicated grassland story by such men as Weston, Stillingfleet and Elliot, by such centres as Cockle Park, Aberystwyth and Jealott's Hill. It also needs a knowledge of sources found in office files rather than on library shelves. The forms used in William Davies's survey of Welsh grasslands in the nineteen-thirties and the examples which T. J. Jenkins prepared of the new varieties he had bred remind us that the historian is concerned with the recent as well as the remote past. They remind us, too, of the progress of agricultural science and technology and the institutional changes that this has caused. As a result, the nearer the historian comes to his own day, the more he needs the assistance of the scientist, the field-adviser and the administrator.

It is, for example, impossible to trace the development of such factors-in-farming as the tractor, the milking machine, artificial insemination or, less technically, agricultural advice and education without the use of institutional records and institutional memories. But this change has brought its own peculiar dangers to historical sources. Anyone who has been concerned with any branch of farming technology for any length of time knows how rapidly the true story of invention and development, of application and adaptation, can be forgotten or unconsciously distorted. Men are transferred to other work, informal records are lost, decisions are filed away in confidential committee papers; and, in any case, responsibilities are so widely spread that no individual, sometimes even no department, can know more than part of the story. So it is not only the history of Old England which requires study and recording. The Museum will need all the help its friends in offices, laboratories and experimental stations can give it if the documentation of contemporary farming development is to be worthy of its achievement. However, a start has been made. The recent acquisition by the Museum of the papers of Sir Alfred Wood, one of the pioneers of sugar beet in this country, is a good omen for those who hope to see the history of their own time made readily available for those who come after them.

It is clear that the Museum, now only ten years old, has already justified the hopes of its founders. Every year has seen a steady growth in its threefold task of collecting relics of the past, accumulating a library of documentary information and adding to the stock of knowledge by research. Every year one or two temporary exhibitions on such varied topics as Welsh woodware and textiles, rural cricket, cattle and sheep from 1750 to 1850 and bee-keeping bear witness to its scope and resources. But it is equally clear that with a limited staff and limited funds it cannot hope to preserve more than a fraction of the heritage which is perishing around us. The Museum's cases and bookshelves can only tell us of victories. They cannot tell us of the defeats, of the destruction and wastage of the surviving past by the careless forces of the modern age. "The harvest truly is plentiful, but the labourers are few". The quotation is obvious. But so, surely, is at least part of the remedy. The Museum can make good use of any help you can offer.

The author wishes to acknowledge the generous help received from the Keeper, Mr. C. A. Jewell, and staff of the Museum of English Rural Life, 7 Shinfield Road, Reading, in the preparation of this article.

The Making of a Farmer

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Principal, Seale-Hayne Agricultural College, Newton Abbot

What are the functions of the agricultural college, the farm institute and the university? How is the technology of farming taught? What are the student's prospects?

"I WANT to be a farmer!" What a wealth of fervour generally lies in such a declaration! What pictures of a satisfying life are conjured up! What a hard road lies ahead! Many hundreds of young men and women have faced me with this challenging cry. Each year headmasters and headmistresses all over the country face the same problem. Maybe it is the natural desire of a farmer's son or daughter, or perhaps an inherited desire for the land passed down by some ancestor. Maybe it is the natural reaction from a life lived in towns with all the artificiality and restriction of the urban complex. Maybe it stems from a love of plants and animals, from an inherent attuning to Nature herself. In many instances the urge has already been partially satisfied, the desire tested, the genuineness proved by spending every available moment during holidays and week-ends on the home farm or with an accommodating, sympathetic farmer near by.

In the last thirty years tremendous developments have taken place in crops, stock, machinery, men, indeed, in the whole business of farming. True, it is still a way of life, but one which demands the highest degree of technical training to ensure success. Why should technical training be necessary? For a farmer in these days to assert that his son or daughter can best learn the job from him at home is the height of absurdity. Yet many people still hold that farming cannot be taught. Equally absurd is it for young people to leave school at the earliest possible moment and drift on to farms as paid workers to pick up their knowledge as they go along.

Functions of college, institute and university

How is a farmer trained, then? you may ask.

Much confusion exists in parents' minds, and indeed with school authorities, as to the different functions of an agricultural college, a farm institute and the university. Obviously it is vital to clear up this confusion first.

The institute trains the workers in the manual and mechanical processes, in the skills of farming; the college trains the farmers, farm managers and general agricultural advisers, whilst the university has the task of training the scientists, research workers, specialist advisers or lecturers. In ascending order the academic requirement for entry varies, each institution setting its own standard within fairly narrow limits. Thus to enter a farm institute up to four "O" level subjects will be required, the college demands six with one or more "A" level subjects, whilst entry to the university probably necessitates three "A" or scholarship level subjects and a language. First then, the vital need is to bring school results into line with the goal in mind. It is fatal to leave

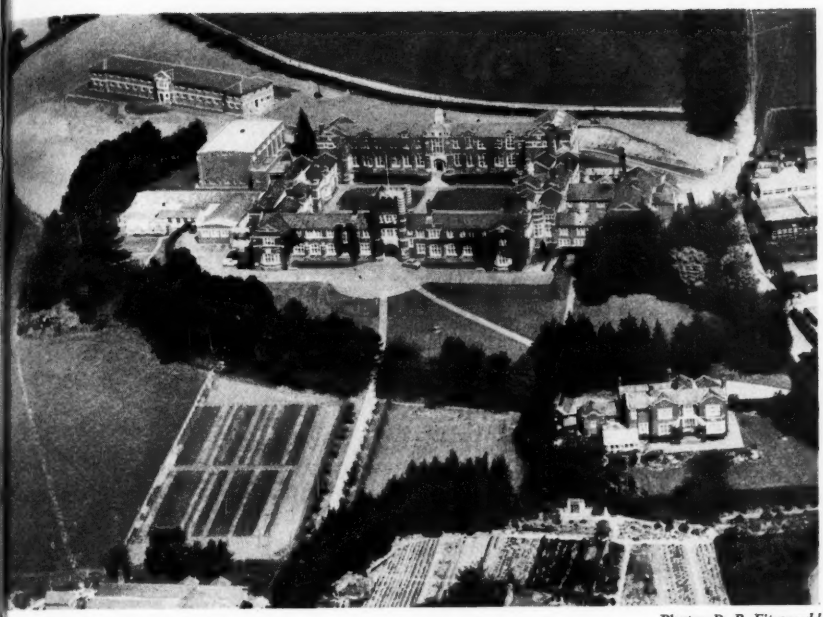


Photo: *D. P. Fitzgerald*

The extensive and attractive buildings of the Seale-Hayne Agricultural College at Newton Abbot, South Devon.

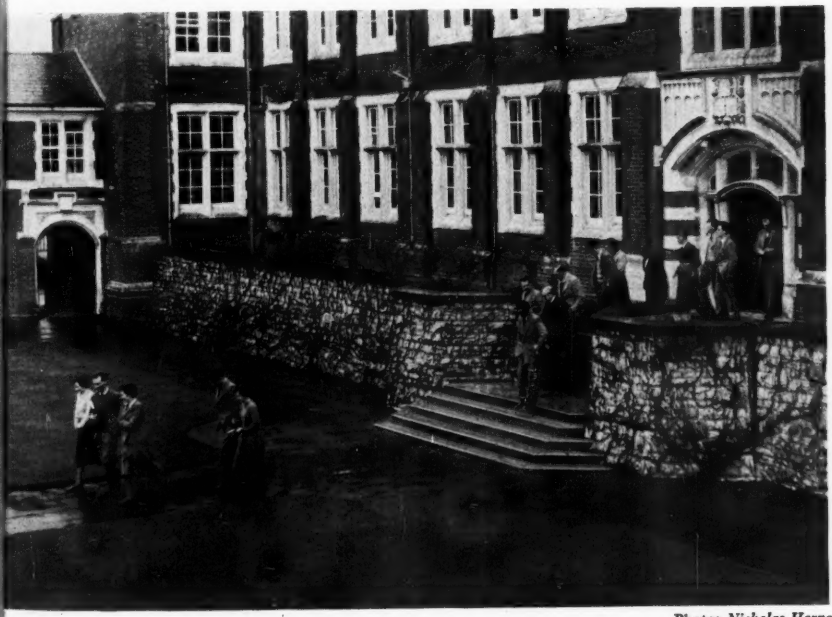


Photo: *Nicholas Horne*

Students leaving lectures for the farm to see in practice what they have been taught in theory.

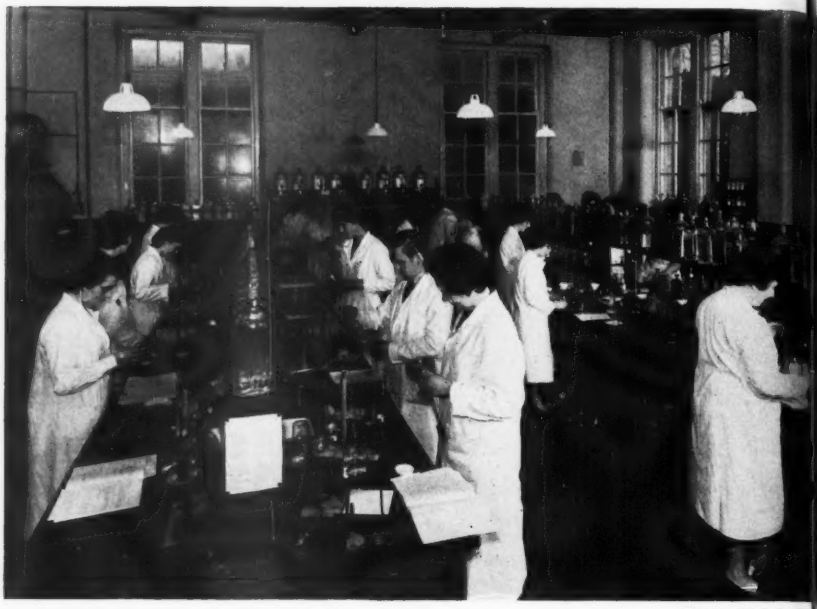


Photo: *Nicholas Ho*

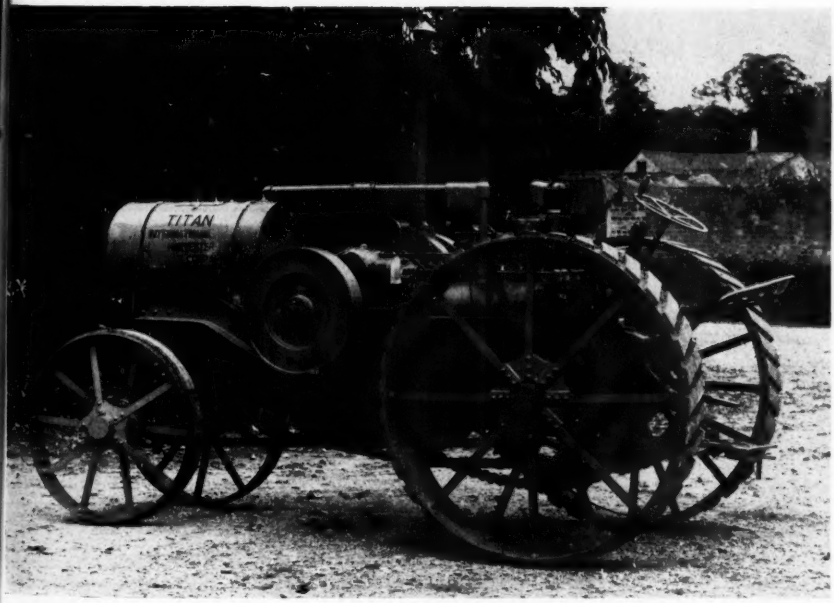
Dairying students in the chemistry laboratory.

Photo: *H. Ian Mo*

Third-year students specializing in farm management discuss with a farmer ways of increasi production.

Museum of English Rural Life (Article on pp. 194-7)

Part of the Museum's permanent exhibition, which is most effectively displayed.



Photos: *University of Reading, Museum of English Rural Life*

A 1917 Titan tractor imported from the U.S.A. to help the food production campaign in the first world war.

Museum of English Rural Life (Article on pp. 194-7)

An early nineteenth-century plough from Pilton, North Devon. The tail and share beam are made from one piece of wood, and the mouldboard is solid oak, clad with iron.

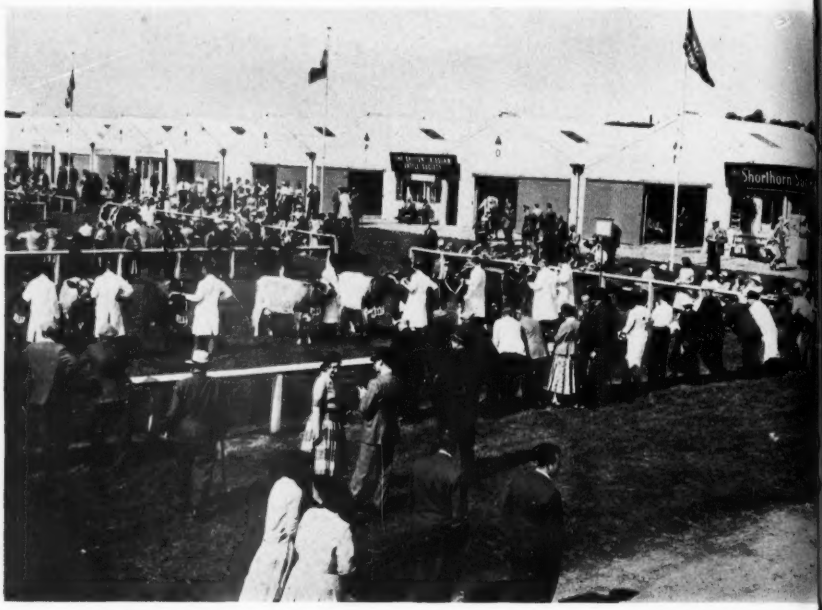
Photos: *University of Reading, Museum of English Rural Life*

A cooper shaving the inside of a barrel stave with a hollowing knife at Reading, Berkshire.

The Great Yorkshire Show (Article on pp. 174-7)

The main show ring under construction in autumn 1954.

Six years later: the showground in use.



Judging one of the dairy cattle classes. Cattle entries have increased by 25 per cent since 1955.

The elegant Ladies' Ante-room in the Members' Pavilion.

Photo: *Bowater Packaging Ltd.*

A non-returnable punnet tray, made from one piece of corrugated fibreboard, which can be assembled quickly and easily by unskilled labour.

Photo: *John Mitchell and Partners Ltd.*

Another attractive non-returnable pack, making good use of colour to draw the eye.

A farm class discussing grassland management.

Photos: *Nicholas Horn*

Tea in the Quad for parents and students

school too early, and all aspirants to farming should secure prospectuses from various places and then seek an interview with the principal of the farm institute, college or university of their choice *before* leaving school. Experience of sixth form work, prefectorial duties and the additional years give a maturity of outlook which is of supreme importance under the freedom which is enjoyed in college or university. Many who come to grief in the first year of their course and have to leave fail on the score of immaturity, being unable to adjust themselves to the change in way of life between school and college.

Practical experience

After school, the potential farmer needs to secure practical experience, its duration and exactitude depending upon the choice of establishment for the agricultural training. One or two years of sound general experience is the usual requirement. The object of this practical experience is not merely to gain proficiency in the routine operations associated with farming but also to obtain an insight into the organization and management of the farm. Obviously the selection of a good farm where the training will be thorough is of paramount importance. Ideally, the farm should carry a good dairy herd, a flock of sheep, a herd of pigs and some poultry. In addition to grassland there should be a reasonable acreage of arable land on which a range of crops is grown. Farmers' sons and daughters should carry out their farm training (which is essential even for them) away from home, preferably in another part of the country, and where a different system of farming is practised. In this way experience is widened and deepened. For all pupils, but especially for those who are town-bred, it is an obvious advantage to live in with the farmer's family. During this training period we require all students to keep a very detailed diary, which is duly inspected. Advice is given as to the information to be recorded, the value and nature of reading during the time on the farm, and contact is maintained until the student reaches college.

Technological training

Training for farming or general advisory work is very specialized and essentially technological in character. Farming, like any other industry, needs technologists—people who can apply the findings of scientists and research workers to the practical problems of production. The feeding of both crops and stock involves a great deal of basic science and a full comprehension of nutrition, metabolism and physiology—to say nothing of the final issue that farming is a business as well as a way of life and economics and business methods need their fair share of consideration. One must also remember the vast diversity and amount of machinery used on farms today, the specialized buildings required for housing livestock, and the need to secure milk and meat production at an economic level. Ponder also the vast field which opens for the control of pest and disease in crops and stock, of the herbicides and fungicides now available, of hormones and their use in animal production. Yes indeed, one needs to be more than brawny and blessed with rugged health to farm in the twentieth century! The right place to secure the essential training is undoubtedly at an institute or college. Results in the past fifteen years prove this conclusively.

Syllabus at Seale-Hayne

Now something about this technical training. At agricultural colleges the object is to provide students with the knowledge of basic agricultural science and how best to apply human and other resources in the feeding of plants and animals. At Seale-Hayne, students are encouraged to take a course of three years' duration. They take their basic diploma in either agriculture or dairying, with the principal subjects of animal husbandry, crop husbandry, dairying, animal health, farm mechanization and farm management at the end of the second year. About half the total teaching time is devoted to science and half to agriculture. The College is situated in the midst of farms, and students move freely between lecture rooms, the field and the laboratory. What is taught in the College is seen in practice on the College Farm. Many of the classes are taken on the farm and it is used as a teaching unit and farm laboratory by every lecturer. To supplement this, students also visit outstanding farms in the neighbourhood, but at a college, as distinct from the farm institute, a student does not engage in the practical work on the farm. The two-year course is completed by the College Diploma in Agriculture or Dairying.

Students in their third year specialize along four lines: farm management, dairying, farm machinery and teaching. The first two are taught at Seale-Hayne. The farm management course is intended for farmers, farm managers or general advisory officers, whilst the dairying course leads to factory management or responsible posts on the manufacturing side of the dairy industry. Those who wish to specialize in farm machinery spend the third year at another college and take the National Diploma in Agricultural Engineering. Opportunities for still further work will be available when the new college at Bedford commences specialized training in agricultural engineering shortly. Finally, students wishing to teach in, say, secondary modern schools having an agricultural bias, or in farm institutes, or join county education staffs will probably take a Teachers' Diploma in Rural Science at Bath or Worcester College. There is an increasing demand for such teachers, a demand likely to continue for many years. Seale-Hayne, however, specializes in farming as such; eighty per cent of the students enter College with the intention of farming for themselves or for someone else, and in fact do so. The remainder seek and obtain professional posts, which are most rewarding, not only in type of work offered but remuneration also.

Sport and social activities

Nor must the fact be overlooked that at college one trains for life and not merely to earn a good living. Students come from all parts of the world and from some forty counties in the United Kingdom. Sport and social activities are also important in fashioning the finished product and we have a strong Christian Union. Plays and classical concerts, formal ceremonies and informal occasions, the Debating Society and Pioneer Club, dances and dinners, a host of comparable activities offer ample scope for the tastes and inclinations of all. All these non-academic activities are the responsibility of the students themselves, who elect each year the officers to serve on the Students' Union under a president and lady president. Moreover, the College (we are 250 strong) is not too large to offer opportunities for all, whereas a

university with many thousands of students allows only the brilliant (in mind and body) or the forceful (in speech and action) to leave their mark.

Farming for yourself

What about the future for these young people? To farm needs capital, and in the majority of cases this is the limiting factor to achieving the goal "I want to farm". A young man entering a medium-sized dairy farm would need implements and machinery amounting to about £30 an acre, although with second-hand equipment about half this sum could be saved. Milking cows and a full complement of young stock would need another £30-£35 per acre, whilst investments in cultivations and growing crops a further £10-£15 per acre. Thus the total capital requirement to embark upon a 150-acre dairy farm is likely to range from say £8,500 to £11,750. In the case of an arable farm the capital needed is not appreciably less, for a rather larger farm would probably be taken. For machinery, livestock, growing crops and working capital, the capital invested on a 200-acre arable farm might range from £9,000 to £12,000, although economies could be effected if used machinery instead of new were bought.

Other farming careers

So for most young people, to farm for themselves can only be a pipe dream. The majority of our students fall into this category, but there are other rewarding opportunities. Many professional and business people turn their interest to farming with the result that there is a steady demand for well-trained professional managers to farm for them. Secondly, the activities ancillary to farming have substantial opportunities. The development of advisory and educational facilities has opened up places for interesting and well-paid careers whether in the National Agricultural Advisory Service or in institutes or schools. The industry connected to agriculture, too, requires agriculturists both on the commercial and technical side, and journalism will need more technically trained persons with the ability to write well. Finally, agriculturists will find worth-while opportunities abroad with the development of the backward countries.

To sum up, the need in the agricultural industry for *trained* people to understand and apply new scientific knowledge and techniques is unquestioned. So, young man (or young woman), your cry "I want to be a farmer" can be answered. Splendid facilities in the way of scholarships and bursaries open up the finest possible training in the world. Hard work will be essential but the rewards pass comprehension. Farming requires consummate skill, energy, and initiative. Then, and then only it can be said:

> His fields seemed to know what their master was doing,
> And turnips and corn land and meadow and lea,
> All caught the infection—as generous as he.

High Quality Seed: A Basis of Sound Farming

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To the farmer or horticulturist, seed is a raw material of first importance. His individual skill or judgment will not make up for deficiencies in the purity of the seed which he uses.

IN an article in the June issue of this Journal, C. S. Elliott and F. R. Horne discussed methods used to assess the merits of crop varieties. When assessment is complete, then obviously enough seed should be available to the farmer or grower for the best varieties to be exploited commercially. This seed must be capable of producing plants true to the form originally bred and submitted for merit testing. It must also be free from genetical and mechanical contamination, and it must be healthy, with a high germination.

Not all the qualities of seed can be estimated quickly at the time of purchase. Some, such as germination and the content of weed seeds, inert matter etc., can be forecast with reasonable accuracy from laboratory tests. But the genetic properties which the seed carries within itself can be determined only when mature plants are grown from it, by which time the farmer will usually have already grown his crop.

The plant breeder aims to combine suitable genetic properties in the plants which form the basis of his variety. It is the duty of the seed multiplier and his technical advisers to maintain these properties in successive generations.

Usually there are two stages in the multiplication of seed. First, the plant breeder or his agent produces relatively small quantities of a variety. This requires special care and a very high standard of seed growing. The second stage is a multiplication on a larger scale to produce enough seed to satisfy the market demand.

The National Institute of Agricultural Botany acts as an agent for the first stage multiplication of varieties bred at official research or plant breeding stations, and the system used by Multiplication Branch of the Institute illustrates this part of the work.

Production of foundation or stock seed

The terms "foundation" or "stock" seed are used to describe seed produced by the N.I.A.B. from seed supplied by the breeder. This multiplication is undertaken either on the Institute's own farm or on contract with farmers in the seed growing districts, under constant technical supervision. Seed from these crops must conform to the highest standards, since it is distributed from Cambridge to the seed trade for further reproduction under approved schemes.

Seed growing is merely an extension of normal crop production in which the crop is not used for feeding or processing, but for the production of further generations of crop. The ideal seed grower is therefore a good farmer, capable not only of producing high yields but prepared to take a close personal interest in seed production, particularly in the timing of operations which affect seed quality. The successful grower must constantly be planning his rotation to provide fields for future seed crops and to control "ground keepers". For instance, he will sow only one variety of barley on his holding, whether for seed or other purposes, and will grow only one variety of a grass or clover species for seed and use no other variety in his leys. The reliable seed grower must always be on his guard against accidental contamination from such sources as the feeding of straw, hay or corn on land due for seed crops, and the unsuitable siting of stacks and dung heaps. He will also ensure that his implements and trailers are scrupulously cleaned when changing from handling one variety to another, or moving from field to field.

In return for his trouble the efficient grower can expect to receive considerably higher net rewards than for most forms of arable cropping, and he should have no difficulty in obtaining contracts for seed crops.

Choice of field

Having found a suitable farmer to produce the seed, the next step is to find the right field for the crop, to protect the purity of the variety. The records of previous cropping must be examined to find out whether it is likely to contain or produce plants whose seeds are difficult to separate from the crop seed. The field itself must be closely inspected before cultivations begin, and the crops growing in surrounding fields noted if the seed crop is a cross-fertilizing type. For cereal seed crops the land must have been free of any kind of cereal for at least two years, and farmyard manure should not have been applied during that period. A rather longer history of up to six or eight years of suitable cropping is required before the smaller-seeded herbage crops are sown, as they may be in the ground for up to six years depending on the variety.

Maintenance of authenticity

After the field has been selected and prepared, it is sown with seed of indisputable authenticity, which for the foundation and stock seed crops are provided by the breeder. However, it is always possible that some off-type plants may be found, so all crops are inspected and rogued row by row before harvest and any such contamination removed.

After harvest, the seed is put into clean sacks, each bearing a code reference showing both the year and field in which it was grown, and also the breeder's seed from which it was derived. These reference labels remain with each lot of seed throughout the period it is being processed and stored by the N.I.A.B. at Cambridge, so that it is easy to trace its history if any complaints arise in subsequent crops. The vital need for accurate identification of each bag of seed at all times cannot be too strongly emphasized.

Handling seed

All the seed handled by the Institute is in sacks, although there is a growing tendency for bulk handling at some stages in many commercial seed houses.

These bulk handling operations and storage do permit economies in large-scale seed-cleaning operations, but they carry an inherent risk of accidental mixture which must be avoided in the relatively small quantities of foundation or stock seed produced by the Institute.

The seed is cleaned in granaries at Cambridge, using a comprehensive range of modern machinery to ensure removal of weed seeds and other impurities. The processing machinery has been modified to give good access for the removal of lodged seed when it is cleaned down between varieties. By its nature seed cleaning is a wasteful operation, since some good seed is inevitably lost in taking out impurities. It is very much better to prevent troublesome weeds from getting into the seed in the field than to rely on seed cleaning in the warehouse as if it were a salvage operation.

Quality control

When the seed is delivered to the granary it is sampled for moisture content and purity analysis. It is then dried if necessary, and the information from the analyst's report allows the granary manager to select the most suitable cleaning machine and the best settings to obtain a high level of purity with a minimum of waste. The seed is further sampled during cleaning, and stringent purity tests are made to check the machine's performance and to decide whether further cleaning operations are required to attain the desired standard of purity. Seed is again sampled before dispatch in sealed bags, and the results are checked in both the granary and the Official Seed Testing Station.

Representative samples of every lot of seed are also sown in plots to check varietal characters. Each sample is grown alongside the original seed supplied by the breeder to make sure that no deterioration has occurred during the multiplication process.

In the case of the vegetable brassicas, the seed is not distributed for further multiplication until it has been screened through a test of this type, because these crops are particularly prone to contamination with related types by cross-pollination. This has occurred even when the seed crop has been isolated by a distance of over one mile from any possible source of foreign pollen.

Storage

The yield of many seed crops, especially clovers, grasses and vegetables, tends to be very erratic from year to year, while the demand for seed shows more gradual fluctuations. It is therefore desirable in the case of foundation or stock to create a "seed bank" which can be built up in good years and drawn on when supplies are limited. Only the very best seed in good physical condition and with a high germination is suitable for storage. It is dried down to about 8 per cent moisture content, and stored in airtight plastic or metal containers. Some of the most valuable seed is held in a refrigerated store. The germination of this stored material is constantly checked, and any seed falling in quality is discarded, but some held under these conditions for five years still has a germination capacity of over 90 per cent.

Production of "field approved" or "certified" seed

Stock or foundation seed is only produced in small quantities, and is relatively rather expensive. In the course of further multiplication to produce commercial quantities of seed, care is also needed to avoid any deterioration or admixture. This is appreciated by seed firms and growers, and in many crops they have given active support to voluntary schemes supervised by the N.I.A.B. The rules of these schemes are designed to introduce technical safeguards ensuring the production of seed which is correctly named for variety.

The schemes are all based on the same principles. Foundation or stock seed from the breeder or his agent forms the basis for all multiplication. Seed crops are inspected in the field and must conform to certain specified standards. Where the scheme ends at the crop inspection stage, the seed produced is called "field approved". In many of the more valuable varieties it is well worth while to supervise the seed through to the final cleaning. When this is done, the seed is called "certified".

Cereals

The main effort with the cereals—wheat, barley and oats—has been the development of the Cereal Field Approval Scheme. This has received particularly strong support from the industry, and has shown a steady expansion since 1947 when about 5 per cent of the country's cereal seed came from field approved crops. After the 1960 harvest, about 20 per cent of the seed supply was in this category.

With a self-fertilizing species such as cereals it is not necessary to go back to the breeder every year for a new stock, provided that each generation is carefully looked after, and stocks are rejected when they fall below the desired level of varietal purity. Thus while this scheme is based on pedigree, and every stock can be traced back to an original breeder's introduction, no limit is set for the number of multiplications through seed. Inspectors are trained at the N.I.A.B. and each crop must satisfy high standards before it is awarded a field approval voucher. The Institute supervises the scheme by checking on the work of the trained inspectors, and by drawing and testing in field plots samples from seed described as field approved.

Herbage crops

For the herbage seed crops, a comprehensive certification scheme is administered by the National Certifying Authority for Herbage Seeds at Cambridge. It was introduced for the 1956 harvest and is now firmly established. About 15 to 20 per cent of the country's requirements of seed of the species included now comes from home-produced "British Certified Seed", although the contribution varies in the different species.

Since the herbage crops are mostly cross-fertilized, it has been found necessary to limit strictly the number of multiplications through seed. Every seed crop entered in the scheme must be sown with "approved multiplication" seed, obtained from the breeder or his agent or, in the case of local varieties, from a specially selected seed crop. This provision ensures uniformity between the commercial lots of certified seed, and prevents deterioration.

Since this is a certification scheme, samples of the cleaned seed are examined and must reach prescribed standards before the bags are labelled and sealed. The labels carry a distinctive trade mark, and may be used only for bags containing certified seed. The samples are tested in plots as a further check on the efficiency of the scheme.

Vegetables

In the vegetables, a relatively small certification scheme for seed of varieties bred at official stations has been in operation for the past four or five years. The N.I.A.B. acts as marketing agent for these varieties, and all crops must be grown from stock seed supplied by Multiplication Branch. Two main types of vegetables have so far been included.

The cross-fertilized brassicas, such as Brussels sprouts, present problems somewhat similar to those encountered in the herbage crops. The crops are inspected in the field, and all plants not typical of the variety have to be removed. Isolation at flowering time is a particular problem with these species, since Brussels sprouts, for instance, will cross freely with kale and many garden crops such as sprouting broccoli. Several seed crops are rejected from the scheme each year because isolation for 1,000 yards around cannot be guaranteed. There is urgent need for the general public to become more fully aware of this problem and to assist the seed growers by preventing brassicas from flowering. The Committee on Transactions in Seeds went so far as to recommend that in areas of intensive seed production legal powers should be available to prevent the indiscriminate flowering of plants which can cause serious damage to seed crops, and there is no doubt that some such provision is necessary if we are to maintain the highest quality in our vegetable varieties. Because of the dangers of cross-pollination, an additional category is provided in the certification scheme: immediately after harvest, the seed is sold as "certified": samples of this seed are grown in special plots during the next season and, if results are satisfactory, the seed can then be sold as "certified and approved".

The other kind of certified seed produced in the vegetables is of "hybrid" tomato varieties. Here the variety must be re-constituted every year by combining two selected parent lines, and hand pollination is necessary. The N.I.A.B. trains those responsible for pollination, and supervises their work, to ensure that the certified seed produced is of a high standard.

Aim of the schemes

Field approval and seed certification schemes provide a close contact between the seed producers and the N.I.A.B. They provide a means by which the latest information on quality seed production can be passed on quickly to those responsible for this most important aspect of the agricultural industry. In this way, they have an influence not only through the seed produced as field approved or certified, but also on the general level of seed production in the country. The stimulus of the FAO World Seed Campaign in 1961 should urge all seed producers to increase their efforts to provide Britain with the highest possible quality of seed.

Fruit and Vegetables for the Consumer

ROGER T. DEAKIN
Ministry of Agriculture, Fisheries and Food

Under this title are considered the presentation of fruit and vegetables for the fresh market and their eventual use for consumption fresh.

ONLY a very small percentage of produce which arrives on the horticultural markets in this country is bought for processing before its sale to the consumer; that is to say, the state of the purchased produce is not changed before it is presented to the customer.

The first consideration should be the eventual requirements of the customer. These must be reflected back and remain among the governing factors throughout the whole chain of marketing. They are, in fact, the basis of success for the whole industry, making it possible for the retailer to give the consumer a service, either by personal sales or the self-service store.

Consumer's requirements

The consumer wants fresh, clean, reliable produce which is essentially palatable and of good quality. The minimum of waste and work must be involved in preparing it for use. Indeed, fruit and vegetables *must* satisfy these requirements if they are to compete successfully with canned, quick-frozen and now accelerated freeze dried foods.

The consumer must receive produce as soon as possible after it has been harvested. Similarly, everything possible must be done to preserve its freshness. Modern techniques to this end include the removal of field heat immediately on harvesting—pre-cooling. Produce is cooled to temperatures where the living processes are slowed down, deterioration reduced and therefore freshness maintained. Cooling is done either by water, i.e. hydro-cooling, for such crops as spring cabbage and watercress, or by air cooling in the case of raspberries and similar crops. The full benefits of such processes are achieved where subsequent transport can be carried out by insulated containers and the lower temperatures maintained throughout the greater part of the time required for the produce to reach the buyer.

The requirements for cleanliness and lack of waste necessitate washing such crops as the roots and celery. Apart from the removal of dirt, the fact that the produce has been washed facilitates more efficient grading for quality and the elimination of damaged and poor produce. The desire to reduce waste also means that vegetables such as cauliflower and lettuce may warrant the removal of a good deal of leaf and outer material before the produce is marketed. The danger here is that over-trimming will reduce much natural protection before distribution even starts. Frequently, tender tissues are exposed which show lack of freshness more readily and are more easily damaged. It may be for this reason that heavily trimmed material is not generally accepted on the English markets. Many retailers seem to prefer trimming at point of sale to enable a more attractive article to be offered.

The consumer also wants fruit and vegetables at the correct maturity and of satisfactory flavour, so the aim must always be for the produce to be at its best at the point of consumption. Produce must be harvested so that peak of condition is reached at the time of its use, not before it is moved into the distribution chain or at some time throughout the period of distribution. Nor should produce be harvested at such a stage in its development that it will not reach satisfactory maturity before deterioration commences.

In the markets

The aim of the grower must be to present his produce on the market so that the consumer's requirements are met and the wholesalers and the salesmen can give, in their turn, the required service to the retailer. Buyers must be able to judge quickly and accurately the value of given packs of produce or consignments as a whole. To do this it must be possible either to see the contents of the packs or in consignments from a reputable source, sufficient of them to verify their reliability. Quality for quality, it is produce which can be so assessed that sells quicker and moves through the markets ahead of other consignments.

With natural products as variable as horticultural crops can be, one of the most important factors in ready valuation is uniformity. Any part of the contents of a pack which can be seen must be representative of the whole pack; similarly, any single pack or part of a consignment should be representative of any one consignment as a whole. If the uniformity and therefore the reliability can be assured from consignment to consignment and through successive marketings, buying and selling can be expedited and simplified.

The eventual aim in this respect is sale of produce by description rather than by inspection. Many horticultural crops and the vagaries of our climate are such that it cannot always be a practical aim in this country. Nevertheless the relatively non-perishable hard top fruits, which can give uniform lines of produce with good continuity, lend themselves to such sales, and there are marks and brands of British produce which can be bought on description—as are the imported fruits of a similar type.

The labelling of produce with identification codes and marks indicating source is of great value in speeding sales. Labels that carry full and adequate descriptions of the contents are of even greater value. Any marks used will inevitably obtain a reputation (this should always be the right one, of course) and such reputations are, in practice, of far greater value in the marketing of hard fruits, as compared with other crops. This again reflects the less rapid changes which take place in the condition of the product and the more continuous flow from any one production unit.

Grades

To help the industry with regard to the degrees of uniformity required—those which can reasonably be attained with a good standard of production—the Ministry has drawn up recommended grades which are issued in a series of Marketing Guides*.

*These are available, free, from the Ministry (Publications), Ruskin Avenue, Kew, Richmond, Surrey.

The schedules of requirements were agreed following the work of advisory committees which represented the three sections of the industry: growers, wholesalers and retailers. The recommendations can therefore be said to be soundly based. The degrees of uniformity required vary from crop to crop. Apples, for example, are the subject of a four grade structure which caters for colour requirements and a size range per pack which is closely uniform in size for produce of top quality. On the other hand, one good quality commercial grade with quite broad size requirements is considered sufficient to meet the demands of the vegetable market satisfactorily.

The grading of fruit and vegetables for quality and size is, of course, essential if consignments are to have the necessary uniformity and to be sold as reliable articles free from defects. Grading for size also increases the eye appeal of samples and (if nothing else) indicates that some effort has been made in their preparation for market, and it therefore gives the consignment a certain added value. Regarding quality grading, with well-grown crops it may only be necessary for such an operation to consist of culling poor quality produce and that which has defects likely to cause deterioration. Growers of produce which warrants marketing only as one good commercial grade should aim to grow crops of a quality which require only light culling to produce a uniform article. In this way the costs of preparation for market may be kept to an absolute minimum.

Containers and their use

The manner of presentation and the need to preserve the harvest freshness and quality govern the packing techniques and containers used. Packing techniques need to be efficient and economical of labour, but they must also ensure that the produce can be transported satisfactorily. Consideration has to be given to ventilation (to avoid heating and prevent excessive drying), the prevention of damage and the need for display. The latter not only attracts buyers but reassures them of the quality and reliability of the product. This is particularly important where lines of continuity are short.

The attractiveness of samples can be much enhanced by the correct use of lining papers and such aids to eye appeal. Colour is important and can be an attraction in itself; also it can improve the appearance of the contents. Packs of carrots and Brussels sprouts, for example, can be made more attractive when containers are used which emphasize the required red or green of the contents. In addition, the containers can be the all-important factor whether or not individual packs reach the point of final sale in good condition and free from damage. The most important requirement of a container is that it should give adequate protection to the produce both from physical damage and damage from natural causes. Ventilation has already been mentioned, but there are other considerations to take into account:

1. The container must be capable of easy handling.
2. Its weight and bulk must be such as to give a high ratio of weight of contents to the weight of container.
3. The cost must be economic, both initially and in use, with a satisfactory ratio to the value of the contents. There is a danger here, however, of seeking too high a ratio, and so courting possible damage and loss of value to the produce in transit.

It is undoubtedly true that returnable containers with their stouter construction carry produce more satisfactorily than their frequently less sturdy non-returnable counterparts. The advantages of the latter type can be many, however; for example, there is the attractiveness of clean new wood and fibreboard. Moreover, the present costs of storing and checking and the subsequent money or paper transactions involved in the use of returnables must be enormous, taken over the trade as a whole. Nevertheless, one of the problems of the industry at the moment is to obtain non-returnable containers which are stout enough to transport the produce satisfactorily to the point of final sale under all conditions (admitting conditions of misuse and even abuse) and yet priced economically. I believe that if the present amount of money turned over, or locked up as capital, in returnable containers could be reinvested overnight to the benefit of non-returnables, the latter would be found to be fully satisfactory and economic.

However, changes must necessarily be slow, and when considering the future development of containers thought should be given to the possible handling techniques which will characterize future marketing. The bulk handling of produce and the palletization of loads at the point of dispatch are present features of many production enterprises in this country. In fact, palletized loads are already delivered to markets and collecting centres. An increase in such techniques is certainly a logical development, and it is important that containers should be compatible with this progress. The laws of progressive standardization are such that development must be from vehicles to pallets and from pallets to containers. In this respect British Standard Pallets* are already developed and in use, and the pallets most applicable to horticulture have dimensions of 32 × 48 inches and 40 × 48 inches. If one may look forward to future ideals, it appears that the 40 × 48 inch pallet should become "the horticultural pallet". In the meantime the development of containers should allow for their use on the two pallets mentioned.

General considerations

There is a further very important factor in the presentation of fruit and vegetables for market. It concerns the knowledge that a wholesaler must have of forthcoming supplies if he is to complete his task satisfactorily. Services between grower and wholesaler and wholesaler and retailer can be more effectively and efficiently carried out the greater the knowledge which the wholesale trade has of the supplies and availability of produce. It is therefore in the interests of growers to keep salesmen informed of quantities dispatched and expected to be dispatched, also of crop and supply positions. Remembering that a salesman should be the grower's agent, there are many instances where liaison between the two could be much improved with benefit to both sides. To instance the increase and potential increase of direct sales which is a current development factor of horticultural marketing, and which is linked with the development of self-service and chain stores, there would appear scope for the wholesale trade to develop more strongly its functions of an agency in this field. It may be that one of the reasons for a certain lack of such development is that the trade has not felt sufficiently confident in its knowledge of potential supplies, or of its ability to acquire such knowledge,

*British Standard 2629: 1955. *Pallets for Material Handling.*

and has therefore not felt able to give the necessary guarantees. A closer relationship between producer and selling agent might overcome this difficulty.

The objectives to be reached in meeting the consumer's requirements for pre-packed produce are the same as those previously mentioned. The aim of pre-packing is to create a more attractive article, and one which can be sold more easily and handled readily at the point of retail sale. This is shown by the fact that potatoes and carrots, crops which could probably gain the most from meeting these aims, have shown the greatest developments in pre-packing. One result of pre-packing is to bring the consumer in closer contact with growers' names or marks and their associated warranty of quality and reliability. To facilitate the maintenance of this warranty, it is necessary that the chain of distribution should be as short as possible. This factor increases in importance with increased perishability of the particular type of produce. Consequently, the trends are for distribution to be along the lines of a delivery service between the packing or assembly point and the retailer. Although this tends to reduce the actual sales of pre-packed produce on the open market, it seems logical that the wholesale trade should be the body to organize the availability and distribution of such produce.

REVISED GUARANTEE ARRANGEMENT FOR BARLEY

Two Statutory Instruments have been made to give effect to the new scheme for barley announced on 17th May. Both Orders came into operation on 1st July 1961, but both require the approval of each House of Parliament within forty days from the date on which it was made.

The Cereals (*Deficiency Payments*) (*Amendment*) *Order 1961* empowers Ministers to make deductions from and additions to a grower's barley deficiency payment to take account of the volume and seasonality of his deliveries (after sale) of barley. The total sum payable by the Exchequer will not be affected, however.

Under the existing Cereals (Protection of Guarantees) Order 1958, growers of wheat, rye, barley, oats or mixed corn are required to keep records of their acreages and of their transactions in wheat and rye, and dealers in wheat or rye are required to furnish to Ministers such information about their transactions in wheat or rye as the Ministers may require.

These provisions are extended and strengthened by the *Cereals* (*Protection of Guarantees*) (*Amendment*) *Order 1961*. As from 1st July, growers' records of transactions will have to cover barley as well as wheat and rye (though records of the prices of barley need not be kept), and buyers of wheat, barley or rye from growers will have to keep records of their purchases in a prescribed form. If Ministers so require, growers and buyers must supply any of the information which they are obliged to keep in record form, supported, if necessary, by the production of the records.

The *Cereals* (*Protection of Guarantees*) (*Amendment*) *Order 1961* also requires all persons who buy home-grown barley from growers for re-sale, or in the course of a trade or business other than farming, to be registered as from 1st July 1961 with the Agricultural Departments, before conducting such business. Registered buyers will be required to make monthly returns to the Departments of their purchases of home-grown barley.

A circular has been sent to all processors of home-grown barley who make statistical returns to the Agricultural Departments and to all merchants authorized for the purpose of the Wheat Deficiency Payments Scheme, telling them that they will be registered automatically. All other buyers in England and Wales who come within the registration requirement should apply to The Ministry of Agriculture, Fisheries and Food, Cereals Deficiency Payments Unit, Government Buildings, Bromyard Avenue, Acton, London, W.3.

Chicory

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Dr. Blakey reports on the results of eight or nine years' intensive study of chicory and its uses in agriculture.

As with other plants of agricultural value, chicory is available in its wild state and in improved forms resulting from breeding and selection. Seed for both classifications is available through commercial channels. It is regrettable that British seed suppliers have adopted names for both types which are almost meaningless.

Chicory is indigenous in Lombardy and in parts of France, and it is from France that the bulk of the so-called "agricultural chicory" is imported into the United Kingdom. Reference to typical British seed catalogues reveals numerous names for wild chicory seed, amongst which we observe "French agricultural chicory", "French common chicory" and "long rooted chicory". Elliott clearly described the chicory he used at Clifton Park as wild chicory or common long rooted chicory, and these names seem appropriate.

Credit must be given to Dutch and Belgian plant breeders for their work in breeding and selecting chicory types and strains for specific purposes. Early, medium and late maturing varieties have been evolved in the leafy and large root types. From the Continental plant breeders' viewpoint, chicory is a crop for human consumption and they are surprised at the British use of it as fodder. The leafy types are normally used for forcing to provide a vegetable during the winter months (from October to April). The large root types are used by coffee-and-chicory blenders, the chicory root being dried and ground before being mixed with ground coffee.

It is from these bred strains, embodying types showing particular leaf or root characteristics, that I have found such valuable material for agricultural purposes.

British garden seed catalogues usually describe chicory for human consumption as "Brussels Witloof" or "French Endive". As in the case of the wild type, it does appear that better terms should be used to describe the bred varieties.

Although numerous types and strains exist it is possible to group them under the following main headings:

Wild types

Lombardy red leaf — French common long root

Bred types

Magdeburg	*Brunswick*	*Brussels*
Leafy	Large root	Leafy
Large root		Large root

I have met no leafy Brunswick strain. The division between leafy and large root types is not clear cut. Excellent leaf characteristics are to be seen in many of the large root types, and likewise excellent root production is noted with several leafy types. The classification is therefore one of degree, based on careful selection by noting dominant features.

Chicory in pastures

First and foremost, chicory is a pasture plant offering nutritious, mineral-rich grazing. Its increasing popularity in recent years has been occasioned by commercial exploitation in pig grazing leys, but all classes of stock relish the plant. It can therefore be used as a major component of grazing pastures, and be associated with grasses and clovers appropriate to specific needs. I consider 6-10 lb of chicory per acre to be effective in association with grasses and clovers of appropriate type. For mainly pig grazing purposes chicory and white clover in equal proportions have given satisfaction over a period of years.

Chicory will establish itself with certainty on a wide range of soils varying from the poorest to the best; from chalks and sands to clays. Its produce is abundant and during the good growing months of the year permits a much higher stocking rate per acre than any other pasture plant. Where a chicory pasture cannot be sufficiently stocked to keep the lush growth in hand, silage cuts can be taken.

Soil improvement

There is a tendency to regard soil improvement as "something connected with the hills". To suggest to the arable farmer that a hard pan just below ploughing depth also calls for soil improvement may surprise him. Mechanical devices cannot compete with the deep rooting chicory plant in breaking through hard pans and penetrating the subsoil to considerable depths. Data has been collected on the rooting habit of the chicory plant, but the winter of 1960-61 gave me an opportunity to make a study at first hand of chicory root penetrations with plants from one to seven years old. As part of a drainage scheme, trenches were dug in land which had been used for chicory trials, and it became possible to examine soil and subsoil structure to a depth of some six feet. Elliott[1] made similar observations in 1904 when the bank of a chicory-bearing field was partly washed away. Penetrations of five feet were commonplace with well-established plants, and the opening-up action in gravel and clay subsoils was noteworthy. The soil and subsoil structure was permeable and free-draining, thus providing good conditions for plant growth. The fact that chicory withstands drought to a major degree is understandable in view of the depth from which it draws its nourishment. One-year-old plants were noted to have roots penetrating to a depth of two feet, but the maximum penetration appears to be attained at three or four years, after which the changes are small. This suggests that a chicory-bearing pasture should be ploughed up at three or four years of age if the maximum benefit is desired from humus and root formations.

Crop conservation

The abundant growth of chicory often calls for topping to prevent excessive stem growth. This suggests its value in silage production. Trials with ungrazed chicory-clover grass plots have shown the necessity of topping four or five times from May to September, and yields of thirty tons of green material per acre have been noted. Silage made with the aid of a forage harvester has proved to be very nutritious. It seems best to omit the plant from grass intended for hay, as the large, fleshy chicory leaves are difficult to cure in

other than exceptionally favourable conditions. Woodman[2] provides the following analysis of chicory leaves dried in early July: dry matter 93·8; crude protein 19·2; oil 3·2; carbohydrate 38·8; crude fibre 13·4; and ash 19·2 per cent. The use of chicory in crop drying techniques is unlikely to prove an economic proposition however, as experimental work shows that the thick midrib of the chicory leaf is difficult to dry and the fuel consumed proportional to the output of dried material is higher than with grass. The drying of chicory roots is a well-established practice in connection with coffee and chicory blending. I have conducted some small-scale experiments using chicory root meal for stockfeeding.

Utilization of leaf and root by stock

Heretofore the leaf of the chicory plant has received attention to the almost complete neglect of the root. The fact that pigs are often seen to seek out plant roots does not seem to have attracted much attention. It is therefore interesting to note the work of Calder[3], who has used a typical chicory–clover—grass ley and observed its performance under Rhodesian conditions. Of particular interest is his investigation into root production and the utilization thereof by grazing pigs. An assessment of the weight of chicory roots per acre (one spade deep) gave a figure of ten tons and, on analysis it was found that the roots had twenty per cent dry matter, and that on dry matter basis, they contained 21·7 per cent crude protein and 65·9 per cent carbohydrates. The root yield per acre is, therefore, equal to a good crop of potatoes, and although the carbohydrate content of chicory roots is rather lower than that of potatoes, the protein content is twice as great. Under appropriate conditions of management, with irrigation in the dry season, it is possible to have chicory growing throughout the year in Rhodesia. Although the British climate is different, the abundant growth of leaf and root in British conditions is well known.

Following Calder's work, I have made observations on root utilization by pigs, and there is little doubt that Calder has advanced valuable suggestions which justify full investigation in British conditions. From the limited amount of experience so far acquired on the utilization of chicory roots, I think it is desirable to permit pig rooting on three or four year-old chicory pastures which are scheduled for ploughing up. An experiment on a one-year-old chicory pasture has been made, and many plants appear to have been eaten right out. The experiments are continuing.

In Britain, as well as in Rhodesia, stock given access at regular periods to chicory pastures have been healthy and singularly free from many diseases and troubles which appear to be prevalent elsewhere. If a highly digestible, mineral-rich herbage provides a good basis for animal health, then chicory pastures must rank highly in any assessment. The carbohydrate component of chicory is in the very digestible form of inulin, and as Brynmor Thomas[4] has shown, it is the most complete of all commonly used plants in the mineral sense. It contains calcium, phosphorous, chlorine, potassium, manganese, copper and iron in well balanced proportions, and animals grazing such herbage obtain their mineral requirements in a natural manner. This may well be the reason for the conspicuous absence of mineral deficiency diseases in stock grazing chicory pastures.

Right up to the present day, the chicory most commonly used in agriculture has been French wild chicory. Elliott mentioned that "some plants may throw up stems" (come to flowering) in their year of sowing, thereby indicating the inconsistency of unselected wild types—a not unusual finding. Chicory seed bought commercially in 1952 was sown and the resultant crop was satisfactory, there being a wealth of leafy plants. From 1954-55 the quality has been seen to deteriorate, and the crop produced from wild chicory seed purchased in 1959 contained a preponderance of very inferior types of plant. This article is not the place to record in detail the results of the test plot and field trials of chicory plants which I have conducted over a number of years. First hand enquiries have shown that the large increase in U.K. demand in recent years for chicory seed has resulted in seed crops being taken from sources which produce very inferior plants. The remedy is obvious.

The introduction of bred strains into my experimental programme was by way of five types obtained from Belgium, and of these, two were demonstrably superior in every respect. Of particular interest was the speed of growth, it being possible to graze the plants three weeks after an early May sowing. A repeat of this trial was conducted in the following year with similar results. Growth rate of this order places these two types well ahead of mustard or rape in coming in to use. The experiments now include many other types and strains, principally from Holland and Belgium, and in due course it is hoped to select types best suited to agricultural use. Consideration is being given to leaf and root as well as other characteristics which must be taken into account in a final assessment.

I thank Mr. Brynmor Thomas, M.SC., Reader in Agricultural Chemistry, University of Durham, and the co-operative Continental plant breeders for their valuable help.

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Farming Cameo: Series 2

39. South Notts

A. J. EDWARDS, B.Sc., N.D.A.

District Advisory Officer

THE southern part of Nottinghamshire, nearly 100,000 acres of agricultural land, contains a wide variety of soil types, from light sand north of Nottingham to heavy clay on the Leicestershire border, with an equally extensive range of farming systems.

The city of Nottingham lies in the north west of the district, where industry and agriculture are intermingled on the edge of the Midland Coalfields. Much of this area has been subjected to opencast mining and subsequent restoration, and ley farming is generally practised to improve the structure of its soils. Many chains of tiles have been laid, and both old and new dykes have been opened up, but with subsidence due to deep coal-mining affecting large areas, drainage remains the major problem. These gray and yellow clays are late to warm up in the spring, and soon become unmanageable in a wet autumn. Milk predominates in the farming economy, though to the north, on the fringe of productive red limestone soils, first-quality potatoes can be grown. The River Trent enters the county on the west and flows across the district on a north-easterly course, separating the industrial Coal Measures from the greater part of the district.

From Trent Bridge, known to cricketers the world over, a narrow strip of alluvium follows the Rivers Trent and Soar down the western edge of the district. Cash root crops and barley are of chief importance in the farming on these free-working soils. Dairying has developed to some extent, but livestock production is based generally on beef, with spring-purchased stores grazing over the summer on the small acreage of permanent grass that remains and finishing in yards over the winter months.

These lighter soils continue eastwards along the Leicestershire border, gradually giving way to heavy boulder clays towards the Fosse Way, which, entering Nottinghamshire at its southernmost tip and following the typically Roman straight line, runs almost due north through undulating, well wooded countryside, mainly under permanent grass. Until recently this area had no mains water despite its proximity to Nottingham and Leicester, and though piped supplies have now been brought to most of the villages, livestock still depend on natural watering-places. Like neighbouring Leicestershire, this is traditionally an area of summer grazing of beef stores, mainly of the Lincoln Red and Shorthorn type. Over recent years, however, the predominant colour has gradually been changing from red to black and white, as Friesian cross-bred cattle have gained in popularity. Sheep numbers too have increased a little, and the North Country Half-bred has given away to the Clun and Kerry from the West Country, generally crossed with a Down tup for lamb production. Early lamb is not the main target however, and most of the flocks lamb down in March or April, when the grass is beginning to grow.

Ley farming systems have only really been developed in this area where dairy cattle have replaced beef.

The Fosse Way levels off in the centre of the district at some 250 feet above sea level to run along the edge of rolling hills of heavy wet land, which in the past were heavily wooded. As the better timber was felled, scrub took the place of the forest and in recent years most of this has been replanted by the Forestry Commission. Sheep, beef and dairy cattle play equal parts in the farming of these wolds, stock numbers gradually decreasing towards the west of the district as arable cropping increases. East of the wolds the land falls steeply to the Vale of Belvoir, noted for its Stilton cheese. Though its soil is very heavy and lacks natural drainage, that part of the Vale which is in Nottinghamshire carries a reasonable acreage of arable land, mainly under cereals but with some feed roots and sugar beet. Heavy tackle is needed to work this soil which, in common with most of the heavier land of the district, responds well to phosphatic fertilizer, basic slag being widely used on the grassland.

North of the wolds and the Vale of Belvoir, the Fosse Way drops to an area of arable farming, where the Lincoln Red still retains much of its popularity, but is tending to give way again to Friesian crossbred animals. Cash roots provide much of the income on this red marl, where the farms are on the whole rather larger than the average for the district, and where yields up to 18 tons of washed beet and 2 tons of wheat per acre can be attained in favourable seasons. Throughout this area, and over the alluvial soils, mechanization has developed rapidly, and those fortunate enough to have a good natural water supply are using irrigation to increase yields. This applies particularly to the north-east corner of the district around Whatton, which must be one of the driest parts of the county. The rainfall here averages about 20 inches a year compared with 25 inches over the majority of the district, and 35 inches on the Coal Measures in the north west.

The southern part of the district is to some extent affected by development, with a few acres of gypsum and cement mining, and the villages nearer to Nottingham fast expanding as residential areas, but agriculture is still the main industry of the area. Most farms carry a few pigs and poultry, but the forward-looking members in the farming community are tending to simplify their farming systems, and to specialize to meet the problems of falling returns.

Your Fixed Equipment

Concrete Farm Roads

P. M. P. WILLIAMS

Agricultural Land Service, West Midland Region

IF agricultural land is to be farmed efficiently and economically, good access to the fields and to the buildings is a first essential. The standard of farming almost invariably deteriorates whenever a particular field or farm is difficult to reach because the tracks or entrance roads are inadequate. Far from solving this problem, the coming of modern farm traffic has aggravated it, for many holdings are still served by roads which were originally designed to cope with nothing more than horse-drawn transport. Unless maintained or improved at considerable expense, such roads soon deteriorate into sloughs of mud in winter or cavernous potholes and ruts in summer. In either state they become a serious hazard to machinery and stock. For these reasons alone, to say nothing of management and amenity, every owner or occupier worth his salt appreciates the value of a sound road system on his holding and does all he can to try and keep it in repair, improve it or, if necessary, provide it.

Of the various materials available for road making, concrete is the best suited to the majority of farm conditions and requirements. Once a concrete surface is properly laid it has a very long life and maintenance is reduced to a minimum. It withstands weather, stock, or heavy vehicles and is the only satisfactory surfacing for use within a busy homestead or where cattle traffic is concentrated. Unlike other materials it is unaffected by dung, mud and continued scraping or washing down.

Unfortunately, the use of concrete for roadwork can be expensive, and on occasion is quite unjustified or uneconomic. Consequently it is not as widely used as would otherwise be expected. Even so it is unwise to be dogmatic about expense, because particular circumstances and requirements make it so variable. For example anyone paying income tax should take into account the capital expenditure claim allowances to which he may be entitled as a result of carrying out such an improvement. Thus, one-tenth of the net expenditure may be allowed as relief from tax in each of the ten years following the doing of the work, plus a further one-tenth investment allowance in the first year. As a result, the eventual cost may well be little more than half the initial expense incurred. If the low maintenance cost compared with other types of road is also taken into account, the concrete road often turns out to be a much more reasonable proposition than it may seem at first sight.

Judicious design will help to reduce costs too. There is a tendency to think that concrete for farm road purposes must be laid at least 6 inches thick, always 9 ft wide and be capable of carrying the heaviest traffic. Such standards are often unnecessary. A depth of 4 inches may be quite adequate. Where the farm traffic is only moderate in frequency and weight, satisfactory results have been obtained with only 2 or 3 inches of concrete when re-surfacing an existing firmly compacted road, although it is advisable to thicken the edges

of such thin slabs. The width may well be reduced to 8 ft, or even 7 ft in some instances: passing places would be essential, of course. Cost can also be lowered by omitting all reinforcement. This is rarely necessary, and is only needed where subsidence may occur—sometimes when the bed of existing roads are badly drained, soft or sunken, it is cheapest to lay an entirely new road elsewhere. In a further attempt to reduce expense, cement grouting and soil stabilization techniques have been developed for use in favourable circumstances. The former involves binding together on site large stones or hard-core by pouring over them a liquid mixture of cement and sand, and is a suitable method for making wheel tracks or roads where rough surfaces can be tolerated. Alternatively, stabilization of a suitable soil with cement to form a hard road requires no sand or aggregate; thus it is useful when local road-making material is scarce, and where traffic is neither excessive nor destructive.

Making concrete roads with farm labour always curtails constructional cost and is a practicable proposition, particularly when ready-mixed concrete is available. The charges for "ready-mix" vary according to the haulage distance, and if the farm is fairly near the source of supply there is little difference in the cost of a road laid with it and one laid with home-mixed concrete. Its use speeds the work whilst providing high quality material, obviates the need for a mixer, cuts out labour to batching and mixing and saves waste. Also, as the concrete is usually carried to the site by mixer lorry it can be placed just where it is wanted direct from the lorry and at the most convenient time. The site must be ready when the concrete arrives, with enough men on hand to get on with placing the load immediately.

Whether the intention is to construct a completely new road or to provide a pavement on an existing one, with either ready-mixed or farm mixed concrete, the standard of workmanship will make or mar the job. A badly constructed concrete road can cause endless trouble, whereas a good one is an invaluable asset. The essentials of success include the formation of a well-drained firmly compacted sub-base; accurately set forms laid to the required levels; properly mixed cement, clean sand, aggregate and water in the correct proportions; thorough compaction of the placed concrete by tamping; provision of expansion joints; finishing to a non-slip surface with the desired camber or crossfall and, finally, "curing" the concrete, i.e. keeping it damp until hardened. Concreting should never be done in frosty weather. Finally, it is worth remembering that all equipment which may be needed, including mixers, formwork and rollers can usually be hired.

Detailed information and advice about the various methods of concrete road making are readily obtainable from either the Cement and Concrete Association, 52 Grosvenor Gardens, London, S.W.1 or the nearest office of the Agricultural Land Service. The Ministry issue a bulletin (No. 145) on the subject of farm roads, and also a leaflet (F.E.F. 33). Both are obtainable from H.M. Stationery Office, the former price 4*s.* 6*d.* (4*s.* 11*d.* by post) and the latter price 8*d.* (10*d.* by post).

Agricultural Chemicals Approval Scheme

Additions to the 1961 List of Approved Products

THE following products have been approved under the Agricultural Chemicals Approval Scheme since the first list of Approved Products was published on 1st February, 1961. The basic List is available, free, from the Ministry (Publications), Ruskin Avenue, Kew, Richmond, Surrey, and from all Regional and Divisional Offices.

INSECTICIDES

DIELDRIN EMULSIONS AND MISCIBLE LIQUIDS

Profarma Dieldrin 15%—Profarma Ltd.

MECARBAM EMULSIONS AND MISCIBLE LIQUIDS

Murfotox Liquid 80%—Murphy Chemical Co. Ltd.

FUNGICIDES

CAPTAN SPRAYS

Orthocide Garden Fungicide—Murphy Chemical Co. Ltd.

MANEB WETTABLE POWDERS

Unicrop Maneb—Universal Crop Protection Ltd.

QUINTOZENE (PCNB) DUSTS

Murphy PCNB Dust—Murphy Chemical Co. Ltd.

THIRAM SPRAYS

Murphy Thiram—Murphy Chemical Co. Ltd.

HERBICIDES

MCPA ALKALI METAL SALT SPRAYS

Nickerson's Gamesafe—E. W. Nickerson & Sons Ltd.
Verdone—Plant Protection Ltd.

MISCELLANEOUS

WETTERS

P.B.I. Wetter—Pan Britannica Industries Ltd.

THE MINISTRY'S PUBLICATIONS

Since the list published in the June 1961 number of AGRICULTURE (p. 164), the following publications have been issued.

MAJOR PUBLICATIONS

Copies are obtainable from Government Bookshops (addresses on p. 230), from any Divisional Office of the Ministry or through any bookseller at the price quoted.

BULLETINS

No. 92. Chrysanthemums. (Revised.) 5*s.* 6*d.* (by post 6*s.*)
Deals with commercial chrysanthemum production outdoors and under glass. New sections have been included on early-flowering varieties under glass, and on year-round production. The list of varieties has been brought up to date.

No. 119. Plums and Cherries. (Revised.) 6*s.* (by post 6*s.* 9*d.*)
Discusses all aspects of growing and harvesting. New and tested varieties are described for the first time, and the sections on planning and planting orchards, cultural management and manuring have been rewritten in the light of recent experience.

No. 123. Diseases of Vegetables. (Revised.) 7*s.* 6*d.* (by post 8*s.* 1*d.*)
Some thirty vegetable crops are covered individually. The diseases which can affect them are described in detail, with methods of prevention and control.

No. 181. Control of Rats and Mice. (New.) 4*s.* (by post 4*s.* 4*d.*)
Primarily for those who control or supervise the control of rodents, but it will also appeal to students and others who have a more general interest in the suppression of these pests.

OTHER PUBLICATIONS

Domestic Food Consumption and Expenditure 1959. Annual Report of the National Food Survey. (New.) 8*s.* 6*d.* (by post 9*s.* 1*d.*)

LEAFLETS

FIXED EQUIPMENT OF THE FARM LEAFLET

No. 15. Shelter Belts for Farmland. (Revised.) 1*s.* 6*d.* (by post 1*s.* 8*d.*)

FREE ISSUES

Obtainable only from the Ministry (Publications), Ruskin Avenue, Kew, Richmond, Surrey.

Farm Incomes, Costs and Management. (Revised.)

Fire Blight. (Revised.)

Swill Drill. (New.)

Uncooked Food Scraps Spell Danger. (New.)

FARM SAFETY LEAFLET

Do's and Don'ts for users of Chemical Sprays. (New.)

In Brief

SUMMER MASTITIS

Summer mastitis occurs in warm and humid summers and may cause great loss in cattle, not only by serious damage to the udder, but also by severe loss of condition and a considerable death rate. The disease is attributed to a widely distributed germ known as *Coryne-bacterium pyogenes*, which causes many diseases in cattle; pneumonia, and suppuration of many organs are examples of some of its activity. Summer mastitis is usually found in July, August and September. It attacks dry cows and heifers at grass and is characterized by hardness of the udder, a purulent evil-smelling discharge, and a high temperature. In acute cases death follows in a short time. It is a very toxic disease and the animal is very sick and wastes rapidly. The diagnosis is easy; the type of discharge, the dry cow at grass and the time of year are all indicative and it can be confirmed by microscopic examination of the discharge, and by culture.

Treatment is unsatisfactory because with many of the modern drugs the life of the animal is apparently saved but the quarter is always lost. Attempts to vaccinate against this germ have not been attended with success. Probably the most useful technique in its prevention is one introduced by Dr. Pearson of Stormont; that is the introduction of penicillin into the teat of each quarter of dry cows at grass in the dangerous period. This gives protection for up to 21 days.

How the disease is spread is somewhat complicated. The old belief is that it is carried by flies, and undoubtedly flies will congregate round a discharging teat and could possibly carry it to other teats. One drop of infected discharge placed on a healthy teat will lead to infection. But the fly theory would not explain why this type of mastitis may be found in the month of February when flies are not to be expected. The organism is on occasion also to be found in the blood stream, so that the infection may come via the blood. Perhaps both sources are involved. In warm, humid summers this disease in certain districts is a serious economic problem to the dairy farmer.

W. R. Kerr

Journal of the Society of Dairy Technology.

PROGRESS OF THE HORTICULTURE IMPROVEMENT SCHEME

At the end of March, 1961 the Horticulture Improvement Scheme had been running just a year—the first of five years in which applications may be submitted. By then 2,169 applications for grant had been made in the United Kingdom. Of these, 1,347 had been approved, 327 withdrawn or rejected and 495 were under consideration. The proposals approved in the year were for work estimated to cost nearly £2 million, of which about £653,000 will come from Exchequer grant, and some of this has already been paid. If the applications still under consideration at the end of March are all approved and the work satisfactorily carried out, additional grant of about £547,000 will be payable, bringing the total amount of grant on applications received by then to about £1·2 million. The first payments of grant were made in July 1960. By the end of March 1961 about £132,000 had been paid.

Nearly 90 per cent of the applications were submitted in England, mainly in the eastern and south-eastern counties.

Of the £1·8 million of work approved in England and Wales during the Scheme's first year, £607,000 was for building works, including cold and gas stores; £568,000 for thermal insultation, vapour sealing and plant and equipment for cold or gas

stores; £341,000 for glasshouse heating improvements; £88,000 for plant and equipment for grading and preparation for market; £66,000 for roads, etc. and £52,000 for grubbing-up of orchards.

Thirty-eight of the applications received in the United Kingdom were in respect of producers' co-operative marketing businesses, 37 in England and 1 in Northern Ireland. Twenty-two of these had been approved by the end of March, involving work estimated to cost about £143,000.

THE MILK MARKET

"The general public should be made more fully aware of the service the dairy industry provides," said Mr. W. R. Trehane, Chairman of the Milk Marketing Board at its Annual General Meeting last month. He referred to discussions which have taken place with both the Government and distributors on the desirability of marketing another higher than average grade of milk to replace what is now familiarly called Tuberculin Tested. "If we succeed", he said, "there will be at least three different grades—all of high quality—freely on offer in all parts of the country. I am sure this is the way to sell more. Consumers differ in their demands, and in their capacity to pay, and it is our job to give them what they want. This policy of high quality and variety in our produce must be extended to milk products.

"Prospects for developing the cheese market are undoubtedly great. While our traditional 'home' varieties are well produced, there is room for extension in numbers and for greater emphasis on English blue cheese, including Stilton. This market may be much greater than we realize.

"All this adds up to new thinking on marketing and selling. We want more research. What does the housewife prefer? What is the measure of change in demand? What more will she take, how much and at what prices? Market research must go along with technical improvements, and the study must be continuous. This requires finance and energy and organization. To be alive to the trends in demand is one thing—to experiment the whole time, producing and testing new varieties of produce, is complementary.

"The report of the Cook Committee confirms our belief that compositional quality of our milk has not varied greatly over recent years, and it has been maintained at a level which reasonably meets the demand of consumers. But the report indicates an important change in attitude. The Committee says that in modern conditions the fat element seems to be less important than solids-not-fat. This arises from better knowledge and appreciation of human nutrition.

"Now that all our dairy cows are attested and supplies of milk are adequate and rising, we must introduce more comprehensive schemes for maintaining and improving composition and hygienic quality of milk. Up to now the Board have only discussed main principles which will mean a greater measure of difference in prices paid to individual producers, according to the quality of milk. Our thinking now is that total solids (including fat, and solids-not-fat or protein) might be the measure.

"As producers know, there is a scheme under which all milk supplies are tested for butterfat, and those which fall below certain levels are penalized through lower prices. The results of this scheme are encouraging and the numbers of supplies penalized are few—and falling. We are considering important extensions of this scheme; a plan for grading milk delivered from farms according to compositional quality, emphasizing the solids-not-fat or protein elements, and paying more for the better grade and less for the poorer. Details still require consideration."

FOREST FIRES

Records of the incidence of fires causing damage to forests in Great Britain and of expenditure on their protection from fire have been kept since 1939. Records for the

28-year period 1929-1956 have now been reported in the Forestry Commission's Forestry Record No. 45.

When the data for the first 20 years were examined, appreciable reductions were made in the amount of money spent on protective measures, to bring it nearer to an economic level. At the same time fire risks were more widely publicized, and instruction in fire protection was given.

During the 28-year period, expenditure on protection against forest fires ranged from £13,500 to £506,000 a year. The annual damage due to fires was assessed at from £2,000 to £165,000. Nearly 25,000 fires were reported, and the damage assessed on the basis of the cost of creating the plantations which had been destroyed, amounted to £800,000. The cost of protection alone came to more than £3½ million.

Allowing for changes in money value the average annual expenditure for 1949-1956, the last 8 years of the period under review, was well above the average of the previous 20 years, but less fire damage occurred. Though the number of fires is about the same they were put out more quickly, and the area of fires which caused damage was smaller. These two factors reduced the losses by more than half.

The report throws some interesting light on the causes of fire. One-third (32 per cent) of the total damage, which includes the cost of extinguishing fires, was due to outbreaks on property adjoining forest plantations. About one-fifth of the fires in this category were caused by heather and grass burning by farmers. Fires started by railway engines caused 17 per cent of the damage, and the same percentage was caused by the general public—by fires started on roads and in adjoining forests or by trespassers in the forests. Employees of the Commission caused 10 per cent of the total damage, of which more than half arose from protective burning operations and 20 per cent from smoking and meal-time fires.

A. J. L. Lawrence

NEW ASSISTANT DIRECTOR FOR N.I.A.B.

Dr. P. S. Wellington has been appointed Assistant Director of the National Institute of Agricultural Botany, and took up his new appointment on 1st July. The vacancy was caused through the death in March 1961 of Mr. G. W. G. Briggs, who had been at the Institute since 1945.

Since 1952 Dr. Wellington has been Chief Officer of the Official Seed Testing Station for England and Wales, which is one of the branches of the Institute. In this position he has been responsible for statutory tests under the Seeds Act, and has initiated a programme of investigations into the problems arising from new methods of handling and conditioning the seed of farm and garden crops.

PLYWOOD

The Timber Development Association has now produced a revised edition of its "Plywood" booklet. The first edition appeared in 1958, to provide a convenient reference for architects, builders, designers and others who might need to select and specify plywoods and who might want to know something about plywood's manufacture and treatment, its properties, available grades, sizes and so forth. Copies are available from the Association at 21 College Hill, London, E.C.4, price 5*s*.

NEW SECRETARY FOR R.A.S.E.

Mr. R. R. Meyric Hughes, Deputy Secretary of the County Councils Association, has been appointed Secretary of the Royal Agricultural Society of England in succession to Mr. Alec Hobson, who is to retire on 31st December.

Book Reviews

Veterinary Annual 1960. Edited by W. A. POOL. John Wright and Sons. 38*s.* 6*d.*

The second issue of the Veterinary Annual maintains the high standard set by the first.

One of the two major sections consists of a series of articles, each of which discusses a subject of current interest to the veterinary profession. The contributions include accounts of the development of the poultry industry in the United Kingdom, veterinary medicine in the U.S.A., and the profession in France. When the control of disease, and methods of increasing food production are being increasingly considered on an international basis, articles discussing overseas professional organization and problems are welcome. In a recreational field, the renewed interest of the last decade in horse-riding is remembered in a refreshing article on "The Child, the Pony, and the Veterinary Surgeon".

The review of current literature consists of articles written by authorities in various fields, and it occupies the larger part of the volume. A division into 16 subjects follows classical lines in considering diseases related to bacteria and fungi, protozoa, viruses, etc., but includes more specialized reviews—for instance those on blood groups of animals and clinical radiology. Among other contributions worthy of note are those on anaerobic infection of domestic animals, on pleuro-pneumonia-like organisms, and on bovine ketosis; in these each reviewer gives his own impression of the literature, and of the significance of the work cited. It is to be hoped that the editor will encourage this approach, and reject the review which has degenerated into a collection of references. Errors are remarkably few, but occasional slips have occurred, for example "cytoplastic" for "cytoplasmic" and "proprionic" for "propionic" on pages 126 and 254.

For research workers, this section of the book can provide the occasional unobserved reference within a specialist subject, and valuable information from other fields. For the teacher it condenses information from the vast annual research output, while for the progressive practitioner it is a source of information on up-to-date therapeutic and preventive measures. The book is pleasingly produced, with good photographs, and is eminently readable; it should have a wide appeal to both veterinarians and agriculturists.

A.B.P.

Science and the Farmer. F. R. ELWELL. Bell. 15*s.*

There is a fairly good range of farming books available for the young, from the "baby animal" type to the drily technical, but here is a book of outstanding merit. It will appeal especially to boys and girls of ages fourteen to seventeen, for whom it provides an excellent picture of present-day farming. Its pleasant and easy style is well suited to the readers for whom it is designed.

The farmer's year unfolds month by month, chapter by chapter. The present is related to the past and our country to others. Science is intimately linked with Nature and we are carefully shown the scientific principles underlying the practical operations of the farm. Science is presented not as dry facts but as the logical consequence of the farmer's thoughts and of events on the farm. In this way it is readily acceptable to the young reader. Science and Nature work together, and we are left in no doubt that such a partnership brings the best results. Many authors when dealing with Nature indulge in a false romanticism, but Miss Elwell's descriptions are attractively simple and ring absolutely true.

There are, however, a few points which might perhaps be reconsidered in the next edition. Would so sensible a farmer as this book's leading character really let his cows get severe bloat? We do not like to think so. The use of the milk cooling apparatus described on page 127 is becoming less general, and it would be better if more modern methods of cooling were discussed. At 15*s.* the price of the book seems rather high. However, the work undoubtedly deserves a place in every secondary school library. Regarded as straightforward reading matter, it is wholly interesting, while used as a work of reference with its comprehensive index, it is most satisfactory. It will make an excellent gift for any boy or girl interested in farming, and for teachers of rural science it will provide a sound and much-needed background to their syllabus.

A.S.

Reactions in the Rumen. A. J. G. BARNETT and R. L. REID. Arnold. 40*s.*

In having its two authors from opposite sides of the Atlantic, this is an unusual book. Professor Reid of Virginia completed the text after the untimely death of Dr. Barnett in Aberdeen. The final result is an exciting account of the work that has been done,

and is still in progress, to obtain an understanding of the special problems of ruminant feeding. Any text quickly becomes out of date when the topic is a growing one with active research, but this book puts the subject so well into perspective, without being in any way dogmatic, that it seems sure to remain of interest for a long period, and to be well worth its cost and space in the library wherever agricultural teaching and research are in progress. In particular it describes the use of simple "artificial rumens" suitable for demonstration or experiment by students themselves.

In this subject British research work, largely under the auspices of the Agricultural Research Council, has been in the forefront since the war, and the authors show how the present knowledge of the complex fermentation system in the rumen has been built up by collaboration between specialists in bacteriology, biochemistry, physiology and many other disciplines. It is now clear that the character of this fermentation is of crucial importance in determining the efficiency with which plant crops are utilized.

Applications of this knowledge for developing new feeding practices are now being explored, particularly in the United States, with the feeding of urea and ethyl alcohol or the deliberate "tailoring" of rations so that their fermentation will give metabolic products particularly suitable either for milk synthesis or lean meat production, as the case may be. The reader will be stimulated into feeling that these are only the primitive beginnings of what might be possible if the scientists and husbandry specialists were now to collaborate with the vigour that has been shown in the fundamental research described in these pages.

K.J.C.

Museum of English Rural Life. Report 1960. University of Reading. 1*s*.

For all that this museum has been in existence a mere ten years, it has gone from strength to strength. Its resources have been small and the difficulties formidable, particularly in the early days, but the achievements of the staff have been remarkable. A great deal of material has been assembled showing agriculture, rural crafts, domestic activities and village life. The displays are impressive and one is astonished at the wealth of material available, from old account books to wagons and implements which have been put in order in the museum's workshops. A visit to the museum cannot fail to be a rewarding experience.

"One of the reasons why the Museum of English Rural Life exists", says the report, "is to have a central archive of information about traditional life in the countryside." People who wish to help the museum are advised how they may do so, so as to preserve a record of rural life and culture. The Keeper of the museum would greatly welcome such assistance, and asks those who are interested to write to him for further information. This report for 1960 is most interesting and informative. Copies are obtainable from The Keeper of the Museum, 7 Shinfield Road, Reading, Berks.

A.S.

Some Statistics of Eggs and Poultry in Britain in 1960-1. K. E. HUNT and K. R. CLARK. University of Oxford Agricultural Economic Research Institute. 7*s*. 6*d*.

The wealth of statistics concerning eggs and poultry published in the last few years is widely scattered among books, documents and periodicals. The fact that many of the more important figures have now been brought together in this book will be widely welcomed.

Ninety pages of tables and charts summarize annual statistics for recent years on poultry numbers, egg supplies and consumption, producer and retail prices, with a few pointers to the international situation. The meat section gives such broad indications as are available of poultry meat supplies and consumption, with prices to producers and wholesalers, and some brief international comparisons. The sources of all figures are quoted.

Not only is this a handy book of reference, and perhaps a stimulant to discussion, but by showing the gaps in poultry statistics it may encourage others to fill them and to decide and provide the kind of statistics which this progressive industry needs.

E.M.C.

Smallholdings with Marketing and Other Services—The Scheme of the Land Settlement Association. 3*s*. 6*d*.

Here is the story of a bold venture, a unique social experiment combined with land settlement, and the first practical scheme of co-operation in farming in this country. Conceived in the depths of economic depression, born into a world of

agricultural stagnation, nurtured through difficult years of peace and war, the Land Settlement Association has reached full maturity with a strength which the originators can scarcely have hoped for.

This little booklet tells how the Association developed from an idea in the minds of a few sociologists in the 1930s who were determined to do more than just watch men rotting on the scrapheap of unemployment. Their scheme was that these men, out of work for years and with no prospect of ever returning to work in their trades of mining and engineering, should be settled on the land. Because these men had no agricultural experience or training they could not simply be provided with a holding and left to fend for themselves, and so co-operative buying and selling, a central supply of agricultural equipment and operators which the smallholders could hire, financial support by loans and a built-in advisory service were set up by the L.S.A.

With the onset of war in 1939, the picture changed. There was more than enough work in the former depressed industries and so the new recruits for the holdings came from the ranks of farm workers and still do. The system of co-operation established at the outset continues, and is reinforced by encouraging the tenants to take an interest in their estate, and the Association, through tenants' meetings and committees.

Although started with funds contributed equally by public subscription and government grant, the estates were taken over by the Minister of Agriculture in 1948 and the L.S.A. now manages as the Minister's agents.

The booklet gives a concise but very readable account of a venture which is unique and still little known to the general public. The author is better placed than anybody else to write this short history. He has been connected actively with the L.S.A. for most of its twenty-five years. His story is frank, and he does not deny that changes for the better could have been made had there been either experience, or the time to gain experience, before embarking on the project. That the scheme succeeded in spite of the immense difficulties is due to the author and his fellow pioneers.

Published to commemorate the Association's Silver Jubilee and obtainable from the Association at 43 Cromwell Road, London, S.W.7., the booklet deserves a wide readership. Well illustrated with photographs and an outline of the Association's policy, this account ought to be better known at home and will undoubtedly help those countries in Africa and elsewhere which have land settlement problems on their hands. *C.R.*

An Introduction to the Scientific Study of the Soil. NORMAN N. COMBER. (Fourth Edition revised by W. N. Townsend.) Arnold. 18*s.*

The fact that this little book has now reached its fourth edition, with numerous intermediate reprints, is a fair indication of its popularity. However, the increasing complexity of the subject is obviously putting a strain on the reviser in deciding what to include and what to omit.

The book begins with a brief account of plant-soil relations and plant growth and then takes up in succession weathering and soil formation, clay minerals, organic matter, soil water and air, concluding the part termed pedology with chapters on profile development, classification and selected soil types. The second part of the book, on edaphology, which is undoubtedly the better, deals with soil fertility, plant nutrients, soil reaction, soil deterioration, analysis and field experiments, soil mapping and soil literature. The sections on nitrogen, phosphorus, potassium and soil reaction are particularly good. However, there seems little justification nowadays for relegating colloids and the theory of pH to appendices.

Certain sections, notably in the pedology part, are reduced to mere précis, and it is doubtful if they are of much value except as reminders. This is perhaps most obvious where soil structure is discussed. The types of structure are briefly listed and followed by definitions of fabric types in Kubiëna's 1938 nomenclature. As these terms are nowhere used in that author's *Soils of Europe*, and rarely by anyone else, their inclusion here can only lead to confusion. The section on clay minerals is well done, but it would have been helpful to indicate the crystal axes, and to mention dioctahedral vermiculite which has been found in the upper layers of many soils. In the tables of chemical analyses it should have been stated whether the Fe_2O_3 and Al_2O_3 figures were for totals or some extractable fraction.

Two other, perhaps minor points are that while olivine is a carrier of molybdenum, olivine-bearing rocks are low in that element compared with granites; the spelling "soloti" should be discarded, the Russian word ending in *d* with a soft sign. Misprints are few, but "hydrophilic" is spelt correctly only once; the Dionne of p. 65 is Dion; the publication *Soils and*

Fertilizers (p. 214) is quarterly, not monthly; on p. 156, Fig 53 should be p. 53.

It is perhaps not for one with a vested interest in soil survey to criticize the chapter on soil mapping, but I thought it quite an achievement to write this without mention of the Soil Survey of England and Wales and the maps and memoirs it produces!

However, all in all, this book will continue to help degree and diploma students over the first hurdles of their introduction to the scientific study of the soil. *A.M.*

Report of Second Cambridge Irrigation Conference. Farm Intelligence Ltd. *Free.*

This little booklet gives the text of several papers and subsequent discussions at a conference in Cambridge in October 1960, organized on behalf of a firm of irrigation equipment manufacturers. The papers cover various aspects of farm crop irrigation, and the allied, though separate, subject of liquid manure conservation and distribution.

On farm crop irrigation there are five papers: a general one covering irrigation requirements, techniques and results for various crops, and others covering costs, returns, irrigation equipment and water provision. The paper by J. J. North, N.A.A.S., who has made a special study of irrigation, is a useful summary of up-to-date practical advice on the purely agricultural aspects, whilst the paper on costs and returns by J. S. Nix, of Cambridge School of Agriculture, though brief, is based on extensive analysis.

Water provision, the major problem in farm crop irrigation, is considered briefly in two papers. Stephen Hawes, a civil engineer, deals with water sources which may be available to the farmer, and the increasing need for farm reservoirs especially to store winter flows. In the second paper a scheme for the conveyance of water as an incidental to a new canal transport system from the high rainfall areas of the north west to the south east is explained by its originator, J. F. Pownall. It is claimed that this scheme would fulfil several functions—but at a cost of £600 million. Graham Bean, N.I.A.E., dealing with irrigation equipment, stresses the need for more efficiency in its design and use, and for the avoidance of some bad practices.

The collection of liquid manure into a pit and its distribution by means of pipes and irrigation-type rainguns is a more recent innovation than farm irrigation, and is based on Continental practice. Although this is called "organic irrigation" by the sponsors of the Conference, the quantities of water mixed with the manure are incidental and not usually significant in terms of farm crop irrigation. A useful explanation of the system is given by Trevor Garbett of the sponsoring firm, and some practical experience and costs are related by David Hawthorne, a farm manager.

Although sales promotion must obviously be the main object of the sponsors, sufficient is known of irrigation generally for us to appreciate the unbiased nature of the papers on farm crop irrigation. Less is known about organic irrigation, but the papers provide useful information, and the other side of the picture, if there is one, will no doubt emerge in the fullness of time. Although the booklet is a useful acquisition for anyone interested in irrigation, as much for the discussions as for the actual papers—and it is free! *C.N.P.*

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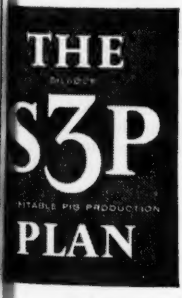

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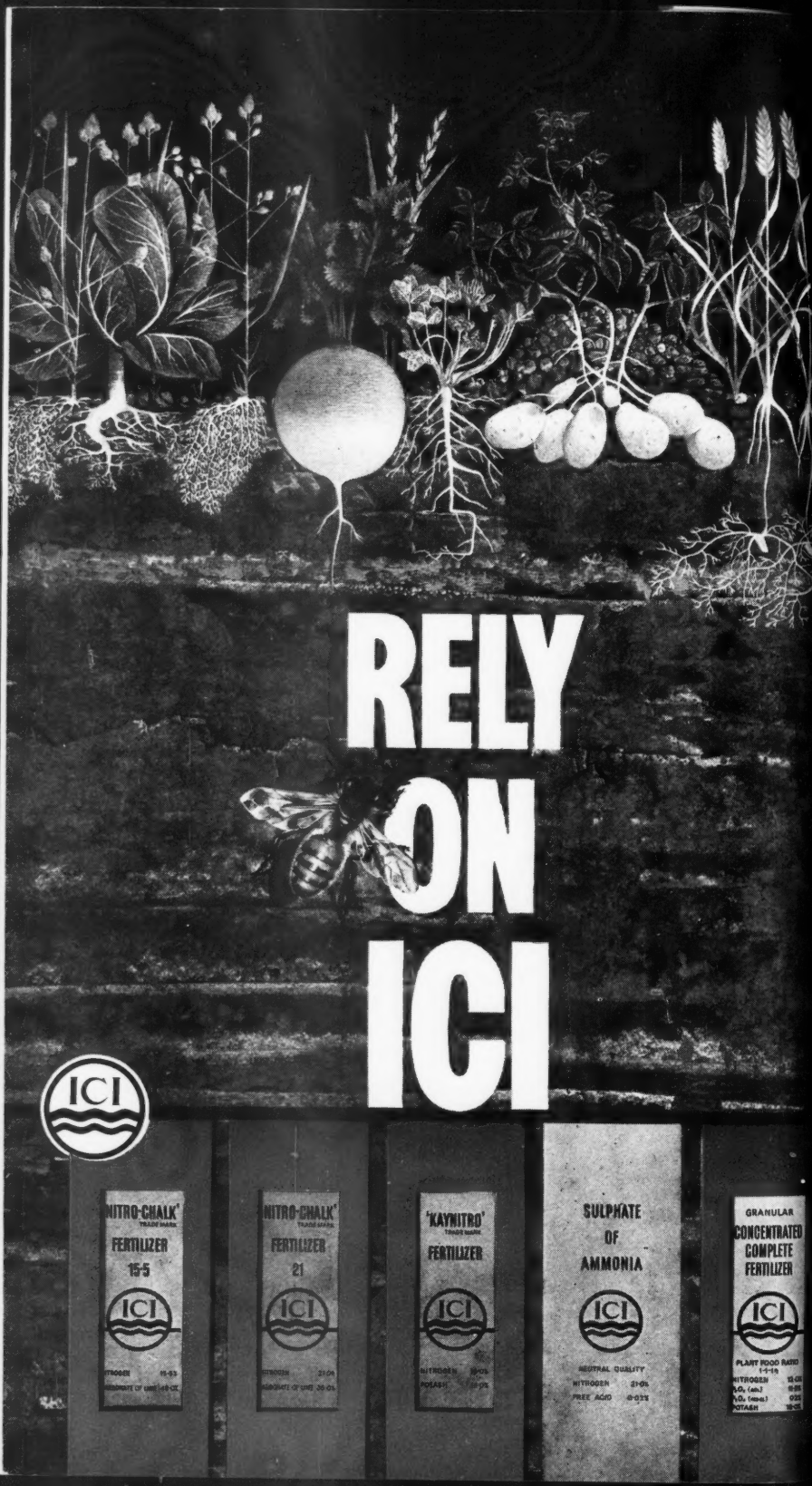
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